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U.S. DEPARTMENT OF THE INTERIOR
PROTOTYPE OIL SHALE LEASING PROGRAM

TRACT C-b

QUARTERLY REPORT #1

(Through November 30, 1974)

Submitted to:

Mr. Peter A. Rutledge
Area Oil Shale Supervisor
Conservation District
U. S. Geological Survey
Grand Junction, Colorado

By:

Ashland Oil, Inc.
Atlantic Richfield Company, Operator
Shell Oil Company
The Oil Shale Corporation

JANUARY 14, 1975

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SECTION I PRE-EXPLORATION ENVIRONMENTAL RECONNAISSANCE SURVEYS

Although not required by the Oil Shale Lease or the Lease Environmental Stipulations, Pre-exploration Environmental Reconnaissance Surveys were initiated by the C-b Shale Oil Project as a means of insuring that the exploration activities involved in the baseline studies were not taking place in significant habitat, vegetation, or archaeological areas, and also to provide information necessary to rehabilitate disturbed areas after exploration activities were completed.

Prior to any disturbance of the Tract C-b area, the site of the proposed disturbance is surveyed by a team consisting of experts in the fields of plant ecology, animal ecology, aquatic ecology, and archaeology. Plant communities present are noted and their condition described. Rare or endangered plant or animal species are searched for, and significance of the habitat is described. If any rare or endangered species are found, or any archaeological areas are discovered, recommendations are made as to action which should be taken to avoid impacting these. In the area of aquatic ecology, in addition to surveying the area for significant species or habitats, the team collects water quality samples to ascertain the quality of the water prior to disturbance of the land surface on the Tract.

The majority of the areas which were surveyed were found to be of no special significance in relation to the Tract as a whole. In several cases, however, the reconnaissance team made recommendations with regard to modifying the location, timing, or method of exploration work which was planned to be done, and these recommendations were followed prior to the initiation of the exploration work.

Table I - 1 Status of Pre-exploration Environmental Investigations - 1/1/75

TABLE I-1

STATUS OF PRE-EXPLORATION ENVIRONMENTAL INVESTIGATIONS - 1/1/75

Location	Archaeological Evaluation	Plant, Animal, and Aquatic Evaluation
Coreholes SG-1 through SG-21 and Roads	X	X
Surface Water Stations 1 through 13	X	---[1]
Support Facilities	X*	X
Air Quality Sites (5) and Meteorological Tower	X	X
Alluvial Wells ("A" Series) 1 through 13	X	X
Relocation of Coreholes SG-6 and SG-7	X	X
Relocation of Corehole SG-17	X*	X
Relocation of Roads to SG-4 and SG-17	X	X
Biological Observation Plots	X*	X*
Powerlines	X	---[2]
Old Coreholes Cb-1, Cb-2, Cb-3, and Cb-4	X*	X
Old Coreholes 71-1, 71-2, 71-3, TG2-1, TG3-2 and Fed 2-b	X	X
Road to SG-18 ("CH-18")	X	X
Area Surrounding Aquifer Test Site	X	X
Road from Piceance Creek to Cottonwood and Sorghum Gulches	X	X
Road from Piceance Creek to Tract	X	---[3]
Road between Cottonwood and Sorghum Gulches	X	X

* evaluation received through verbal communication; no written report

---[1] installed by USGS prior to biological reconnaissance; minimal disturbance

---[2] minimal biological disturbance

---[3] judgment that improvement of already heavily-travelled road would not result in increase in biological disturbance

NOTE: the following report was submitted to the C-b Shale Oil Project on July 15, 1974, as the result of a reconnaissance survey which took place during the week of May 13, 1974. Parts of the included discussion are presently out-of-date because of changes in the drilling program which have taken place since this time. These changes are reflected in the various letter-reports which follow this printed report.

Project 74-669

PRE-EXPLORATION ENVIRONMENTAL RECONNAISSANCE

Tract C-b Core Drilling and Associated Groundwater Program

Prepared for

ATLANTIC RICHFIELD COMPANY
Denver, Colorado

July 15, 1974

WOODWARD-ENVICON, INC. • Environmental Consultants

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PRE-EXPLORATION ENVIRONMENTAL RECONNAISSANCE FOR TRACT C-b CORE DRILLING AND ASSOCIATED GROUNDWATER PROGRAM

INTRODUCTION

The Exploration Plan submitted recently by the Operator (Atlantic Richfield Company) for Federal Oil Shale Tract C-b covers the proposed exploration drilling work. The Operator proposes to drill up to 17 core holes on the Tract in 1974. In addition, it is also proposed to construct a short (one-quarter mile) road leading from an existing road to site No. 13. Access to all other proposed drill sites will be along existing roads which will need improvement by gravelling or grading. Figure 1 shows the proposed drilling sites and access road locations.

Tract C-b is located in the Piceance Basin approximately 20 miles west of Rio Blanco, Colorado. A series of gulches drain Tract C-b to the Piceance Creek (see Figure 2), which in turn drains into the White River. Much of the vegetation on the ridges and slopes of Tract C-b has been recently disturbed as a result of the application of range improvement techniques.

Prior to the conduct of the core drilling and associated activities, Woodward-Envicon, Inc. conducted a five-day reconnaissance of the areas to be disturbed. This reconnaissance included observations of vegetation, wildlife, and aqautic biota and water quality.

This report presents a brief description of the vegetative, wildlife, and aqautic resources, and evaluates possible adverse impacts due to the proposed core drilling activities and access road improvements. The survey also provided preliminary information on each core drilling site prior to disturbance.

Also at the Operator's request, a brief reconnaissance of proposed air quality monitoring station sites and trailer sites was conducted. These sites are also shown in Figure 1. In addition, four previous drilling sites were also surveyed.

Woodward-Envicon acknowledges the contributions of Dr. Warren R. Keammerer and Dr. Robert E. Stoecker to the studies of vegetation and wildlife, respectively. They and the Woodward-Envicon biologists conducted the field reconnaissance and were the principal investigators for those subjects.

The resumes of all personnel involved in the reconnaissance are included in Appendix A. All laboratory work was performed by the same personnel who carried out the field work.

VEGETATION

Observations were made during a three-day reconnaissance survey of the Tract (May 13-15, 1974). Each of the proposed core drilling sites, air quality monitoring and trailer sites, and previous drilling sites was visited. The current status of the vegetation was noted, and lists of conspicuous species were made. It must be emphasized that the lists are brief and incomplete because of the early season conditions, and also because of the short observation time at each site. Therefore, the presence or absence of rare or endangered plant species is not documented. During the course of detailed investigations that will follow on Tract C-b, special attention will be given to this subject.

In addition to the field observations, a limited quantitative sampling program was conducted at six drilling sites that were representative of all sites to obtain a clearer picture of vegetation structure. Four 100-ft belt transects and line intercepts were sampled at the six sites following standard sampling techniques (Lindsey, 1955) to obtain data on shrub frequency, cover, and density. Five one-centare quadrats were sampled at each of the six sites to obtain frequency data for the ground layer herbaceous species. These samples provide only an indication of the vegetation structure, since a sample of such limited extent provides data which are highly variable. This must be considered when evaluating the data presented in the following section.

Description of the Drilling Sites

The areas in which the core drilling sites occur can be separated into five vegetation or cover types: pinyon-juniper woodland, chained pinyon-juniper, ridgetop sagebrush community, valley floor sagebrush community, and valley floor pasture. Of these, the chained pinyon-juniper is the most widespread, and ten of the drilling sites are located within this type. All of the Tract is grazed and browsed and the effects of livestock and big game can be seen in each of the types.

Pinyon-Juniper Woodland. Prior to 1966, pinyon pines (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) covered much of the Tract. In 1966, as part of a range improvement program, the Bureau of Land Management (BLM) chained approximately 3000 acres of pinyon-juniper woodland on the ridges and more gentle slopes of the Tract. Only the easternmost ridge escaped this treatment, and this is where drilling site 17 is located. Many of the trees on this ridge are small- to medium-sized, and in several places the density is great enough to form a closed canopy. A few large trees occur, however, and a pinyon pine with a 33-in. diameter is located approximately 60 yards south of the proposed drilling site. The shrub layer in this woodland is composed mostly of snowberry (*Symphoricarpos oreophilus*), but nine other shrub species add to the diversity of the site (Table 1, site 17). Eighteen species were encountered in the herb layer sample with western wheatgrass (*Agropyron smithii*), mutton grass (*Poa fendleriana*), and a cushion-forming species of *Phlox* occurring as the most common species (Table 2, site 17). A total of 29 species were observed on the site (Table 3). The average cover in the herb layer was 30 percent, which is comparable to that of the chained areas.

Chained Pinyon-Juniper. The chained areas appear devastated. The ground is strewn with dead trees, and the intervening areas are trampled as a result of livestock grazing. The species composition of these areas is very similar to the pinyon-juniper woodland understory; however, because of the disturbance, there is a larger component of annual species characteristic of grazed areas. On most of the chained sites, big sagebrush (*Artemisia tridentata*) is the most common shrub species (Table 1, sites 5, 11, and 15); however, numerous shrub species occur on these sites. It can be imagined that the chaining had a less severe impact on the shrub and herbaceous species, and they have recovered much more quickly than the trees. Most of the shrub species are tolerant of full-sun conditions, and only snowberry seems to have decreased significantly on the chained sites, where it occurs more frequently in the shelter of the downed trees

than it does in the open. Total shrub cover on these sites averaged 11 percent with cover contributed by 13 species. The herbaceous layer contained numerous species (Table 2, sites 5, 11, and 15, and Table 4). Indian ricegrass (*Oryzopsis hymenoides*), cheatgrass (*Bromus tectorum*), false dandelion (*Agoseris glauca*), and squirrel-tail grass (*Sitanion longifolium*) were some of the most common species. Cover in the herb layer averaged 21 percent.

Ridgetop Sagebrush Community. Intermixed with the original pinyon-juniper woodlands were openings in which big sagebrush was the dominant species. These were also chained as part of the BLM improvement program. The sagebrush has recovered from the treatment and now occurs as a recognizable cover type interspersed with the destroyed woodland. Big sagebrush is the dominant species (Table 1, site 6), but numerous pinyon and juniper saplings indicate possible successional trends. Total shrub cover on the sampled site was only 5 percent. Eight herbaceous species encountered in the sample had frequency values of 100 percent (Table 2, site 6) which is indicative of a rather homogeneous herb layer. A total of 24 species was recorded from the ridgetop sagebrush drilling sites (Table 5).

Valley Floor Sagebrush Community. Most of the valley areas between the ridges support rather extensive sagebrush communities. In places the sagebrush has been cleared and the valley floors serve as pastures. In most places the sagebrush is browsed even though the sites have not been cleared. Big sagebrush and winter fat (*Eurotia lanata*) were the dominant species at site 14 (Table 1). Many of the individual plants were small and very numerous (9280 total shrubs/acre). Two species of rabbitbrush (*Chrysothamnus nauseosus* and *C. viscidiflorus*), although not abundant on the sampled site, are also important on the valley bottom sites. Cheatgrass and blue grama (*Boutelous gracilis*) were the most common species in the herb layer, where a total of 13 species covered 30 percent of the ground (Table 2, site 14). In all, 16 species were observed on the two drilling sites occurring in this vegetation type (Table 6).

Valley Floor Pasture. Only one drilling site is located within this cover type (site 8). The species composition is similar to the sagebrush type discussed above, but the shrub component is greatly reduced. Twelve species were observed on this site (Table 7).

Anticipated Impacts Resulting From Core Drilling and Road Improvement

Drilling Sites. The previous disturbances from chaining and grazing which characterize the Tract greatly reduce the impacts which will result from the drilling operation. It is difficult to imagine impacts as severe as those which have already occurred on the site. The drilling sites themselves will disturb less than 2 acres on the Tract, and approximately 60 percent of this area occurs on chained pinyon-juniper sites. The impact of drilling on these sites should be negligible. Six of the remaining sites occur on either sagebrush or pasture sites which are grazed, thus reducing the impact of drilling operations. Drilling will, however, result in a small area removed from productivity for a short time. This may result in some increase in grazing pressure on other portions of the Tract. Therefore, there may be a temporary need to reduce the number of livestock allowed to graze on the Tract and/or to readjust the period of time permissible for grazing. With proper care, these sites should not be too difficult to revegetate.

The remaining site (site 17) is located in a pinyon-juniper woodland on the only unchained ridge on the Tract. Impacts on this site would include destruction of several medium-sized trees and removal of the understory. In light of the extent of chaining, the loss of a few more trees seems relatively insignificant. However, a possible alternative may be to position the drilling site in an opening in the woodland located about one-half mile north of the present site. The alternate site is covered by an open sagebrush community and, besides obviating the need to cut trees, the site would be easier to revegetate. A second alternative would be to eliminate any site on this ridge, since an impact greater

than construction of the site itself will be the improvement of the access road along the ridgetop. It is suggested that the information to be gained from a drilling site on this ridge should be carefully weighed against the impacts resulting from road improvement and site preparation.

Road Improvement. Aside from the already mentioned problem with the site 17 access road, minimal impacts will result from road improvement on the Tract. Most of the roadways are located in the chained pinyon-juniper areas, and improvement will have a negligible impact on the vegetation. If possible, it is recommended that roadsides be graded to prevent mounding of the material scraped from the roadbed.

Two interesting species (*Anemone patens* and *Clematis hirsutissima*) occur along the access road out of the West Fork of Stewart Gulch to the ridgetop where site 13 is located. Road construction along this route should be controlled so that these species are not adversely affected. (These two species are not rare in Colorado; they are abundant wildflowers. However, the location described above is the only site where these species were noted on the Tract, and for this reason they are of interest.)

Locations of Air Quality Monitoring and Trailer Sites

The air quality monitoring sites and trailer sites are located on agricultural lands, chained pinyon-juniper, and ridgetop sagebrush sites which are similar to those sites studied for preliminary quantitative information. Impacts on the vegetation will be negligible at the selected sites. No additional roadways will be needed for access to the sites.

Impact of Wastewater from Previous Drilling

Each of four previous core drilling sites on the Tract were visited to determine the extent of impact resulting from wastewater produced during the drilling operation. At each site the impact was limited to small rills which were cut into the substrate. These required considerable searching to locate, and had we not been alerted to their locations and origins, they would have been overlooked.

Summary

The exploratory drilling operation will have negligible impact on the vegetation of the Tract. Previous disturbances from BLM range improvement techniques have destroyed the natural features, thus reducing the magnitude of impact of subsequent surface modifications.

If possible, it is recommended that drilling site 17 be moved to a location approximately one-half mile north of its current position in order to minimize disturbance to the surrounding pinyon-juniper vegetation.

Impacts from air quality monitoring sites and service trailers will be negligible.

No serious environmental impacts caused by wastewater from previous drilling on the Tract were noted.

Literature Cited

Lindsey, A.A. 1955. "Testing the line-strip method against full tallies in diverse forest types." *Ecology* 36: 485-494.

WILDLIFE

Preliminary wildlife investigations were also conducted on Tract C-b from May 13 through May 15, 1974. Potential hazards to wildlife or to wildlife habitat were considered, including those caused by traffic, modification of existing roads, and disturbances around proposed drilling sites, trailer sites, and air quality stations. In the course of the field reconnaissance in these areas, conspicuous birds and mammals were identified and tracks, dens, trails, etc. were noted. Particular attention was given to the possible existence of critical habitats, important migrational routes for deer and elk, strutting grounds for sage grouse, or other rare or unusual situations of value from a wildlife standpoint. During this brief preliminary survey, no rare or endangered species were encountered. However, in the detailed investigation that will follow special attention will be given to these species.

Interesting Wildlife Areas

Few natural areas remain on the Tract C-b because of the Bureau of Land Management's extensive chaining program and the attendant grazing by cattle. The remaining natural areas include some of the lateral draws in Willow, Scandard, and Stewart gulches, some of the smaller valleys with trees and rim rock, and a ridge-top grove of pinyon-juniper where drill site No. 17 is located. These areas have potential as small refuge for non-game and game species and contain some of the only cover, nest sites, and den sites important to the more aesthetic animal species. Modification of existing roads and disturbances around drill sites should have no important deleterious effects with but one exception. Disturbance near drill site No. 17 should be minimized because this is also an important habitat for deer and all other wildlife species common to mature pinyon-juniper forests in this region. If drill site No. 17 could be relocated to the clearing approximately one-half mile to the north, less disturbance and damage to wildlife habitat would occur.

Specific Wildlife

Mule Deer and Elk.* Mule deer are abundant on Tract C-b as was evident by tracks, deer pellet groups (Table 8), and the extent of shrub utilization. The four most important browse plants on Tract C-b are serviceberry, bitterbrush, mountain mahogany, and oak. These appear to be rather evenly distributed over the tract, except that oak is more abundant in the lateral draws. The distribution of the browse plants as well as the watering locations are such that little possibility exists for deer or elk being especially attracted to or dependant upon habitat near roads or drill sites.

Migrational routes on Tract C-b are most probably limited to typical "deer crossings." They are unlikely to be anything more impressive since these deer are members of the now well-known migratory deer herd of the Piceance Basin. Deer and elk do have a propensity to cross roads at certain locations, but usually because of some local topographic or vegetational feature which provides cover, green grass in early spring, hay in winter, etc. Drill site No. 14 is probably on a well-used deer crossing, and during fall and winter considerable movement across the road is likely to occur at this location.

No significant habitat destruction or other undesirable effects on deer or elk are to be anticipated from the preliminary drilling and road modification planned for Tract C-b.

Other Mammals. Coyote tracks were common along the rim rock in the lateral draws. Several species of smaller mammals were seen, including chipmunks, ground squirrels, and marmots in the lower valleys. Evidence of pocket gopher activity and woodrat and other cricetid rodent signs were seen but were not unusually common. No disturbance to small- and medium-sized mammals is to be expected from preliminary work on the Tract.

Raptors. Five species of raptors were identified, and a number of raptor nests were observed among the cliffs of Stewart and Willow gulches. One large inactive raptor nest is located approximately 200 yards west of drill site No. 8, and disturbances to nesting birds could occur if nesting and drilling coincide. Whether the nest will be active next spring, however, is unknown. However, as a precautionary measure, it is recommended that drilling at this site be carried out in late summer/early fall. No other significant impact on raptors is anticipated as a result of preliminary work on the Tract.

Other Birds. Twenty-four species of birds other than raptors were identified in the area. No strutting grounds of sage grouse were found, and it is unlikely that these game birds occur on the Tract. Bluegrouse undoubtedly occur, but none were seen. No important impacts on non-game or game birds are likely from the preliminary work on the Tract.

Summary

In summary, the only important concern from a wildlife standpoint is that appreciable disturbance in the vicinity of drill site No. 17 is likely. This could be avoided by relocating the site to the north in an existing clearing if such a relocation is compatible with the planned exploration activities.

Table 9 provides a list of birds and mammals observed by sight, sign, scat, tracks, etc. on the lease land.

WATER QUALITY AND AQUATIC BIOTA

The inventory of water quality and aquatic biota provides baseline information prior to drilling disturbances and associated activities on Tract C-b.

It would have been desirable to select sampling stations to reflect drainage upstream of Tract C-b, drainage within Tract C-b, and drainage downstream of Tract C-b. However, drainage channels upstream and within the Tract were dry during the period of reconnaissance and therefore the selected sampling stations (as shown in Figure 2) were all downstream of the Tract. Specifically, six sampling stations were located along Piceance Creek, three stations along Willow Creek, and one station in Stewart Gulch. Water in lower Stewart Gulch came from several irrigation reservoirs; however, upper Stewart Gulch was dry and consequently not sampled. Likewise, several of the gulches which drain Tract C-b were dry, and no aquatic organisms or water quality samples could be collected. These included the West Fork of Stewart Gulch, Sorghum Gulch, Cottonwood Gulch, and Scandard Gulch.

Water Quality

Water samples were analyzed to determine levels of important chemical parameters with respect to aquatic flora and fauna of Piceance, Willow, and Stewart creeks.

Water quality sampling consisted of taking one-quart water samples at three stations along Piceance Creek (P-1, P-3, and P-6), two stations on Willow Creek (W-1 and W-3), and one station in Stewart Gulch (S-1). Samples were analyzed in the field using a Hach DR-EL/2 portable test kit for the following parameters: temperature, pH, total alkalinity, carbon dioxide, specific conductance, dissolved oxygen, total hardness, total iron, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, ortho-phosphate, and turbidity.

The chemical composition of water is important since it can either limit or enhance the survival of aquatic organisms. For example, critical life stages or metabolic processes of these organisms can be affected by changes in water quality. Optimum values exist for all chemical parameters which can be used as indicators of favorable conditions for the survival of resident aquatic organisms.

The permissible range of pH for aquatic fauna depends upon a combination of factors such as temperature, dissolved oxygen, and the presence of various anions and cations. Naturally occurring pH levels are usually in the range of 6.5-8.5. Temperature is important in the regulation of metabolism, growth, and reproduction. Dissolved oxygen in amounts greater than 5 mg/ℓ is generally necessary to sustain healthy aquatic life. Specific oxygen requirements of fish vary with species, age of fish, temperature, and the concentration of other substances in the water. Carbon dioxide, a by-product of metabolism and aerobic decomposition of organic matter, can be lethal in high concentrations, but can also be beneficial to fish by lowering the pH and decreasing the un-ionized ammonia in certain waters.

Alkalinity of water defines the combined effect of several dissolved substances and conditions. Hardness results from a concentration of certain cations in water, such as calcium or magnesium. Hardness is increased by return flow from irrigation ditches and by natural accumulations of salts from contact with soil and geological formations.

Iron is an important constituent in animal diet. Concentrations in natural waters are usually buffered and are normally less than 10 mg/ℓ.

Phosphates and nitrates can occur in groundwater as a result of degradation of organic matter and leaching from agricultural fertilizer applications. Phosphate and nitrate concentrations stimulate the growth of plankton and aquatic weeds, indirectly stimulating increased fish population. Ammonia nitrogen in surface or groundwater generally results from the decomposition of nitrogenous organic matter. Large concentrations can be toxic, but the presence of carbon dioxide does reduce the toxicity.

Turbidity can be detrimental in the aquatic environment by reducing photosynthesis and primary productivity. At high concentrations the particulate matter that produces turbidity may cause death by clogging the gills of fish. It may also reduce the ability of fish to find food, and can alter the temperature regimes of a body of water.

Salinity is determined by the concentration of dissolved solids in water. The determination of specific conductance (μmhos/cm) is an acceptable indirect method to measure the dissolved solids. In natural waters the dissolved solids consist mainly of carbonates, bicarbonates, chlorides, sodium salts, and other minerals. All substances in solution exert osmotic pressure on the organisms living in it, and the aquatic life is adapted to the conditions of the ambient environment. Wide variations in the dissolved solids can have a deleterious effect on aquatic life by changing the osmotic pressure sufficiently to result in an excessive transfer of water into or out of an organism.

Results of Field Analysis. Among the series of gulches that drain Tract C-b, only Stewart Gulch and Willow Creek Gulch contained water. The water flowing from these gulches into the Piceance Creek was very hard and alkaline. Stewart Gulch water is spring fed and high in dissolved minerals, as indicated by total alkalinity of 450 mg/ℓ and a specific conductance of 1400 μMHOS/cm. Willow Creek which enters Piceance Creek at the lower end of Tract C-b drainage had water quality similar to Stewart Gulch (Table 10).

Concentrations of dissolved minerals as indicated by total hardness and specific conductance was slightly lower in Piceance Creek than in the water from Stewart Gulch or Willow Creek Gulch. This may be due to the diluting influence of surface and irrigation waters on dissolved minerals in Piceance Creek (May, 1970).

Generally speaking, the waters that drained Tract C-b were hard and alkaline in quality. Actual values for water quality parameters can be extremely variable and would reflect local conditions regulating the flow

of surface and groundwater in the area. Rainfall, livestock, and irrigation activities all can cause fluctuations in the values of the water quality parameters that were measured.

Heavy livestock utilization of pastures in the Piceance Creek Valley probably results in a certain amount of nutrient material being leached into Piceance Creek by irrigation runoff and other surface water. The small amounts of ammonia nitrogen, nitrate nitrogen, and ortho-phosphate present in the water sampled indicate that agricultural activity does have some influence on the water quality.

Aquatic Biota

Benthic Investigations. Benthic invertebrate samples were taken at six sites on Piceance Creek (P_1 - P_6), three sites on Willow Creek (W_1 - W_3), and one site in Stewart Gulch (S_1). Organisms were collected by vigorously disturbing the stream substrate for a standard 30-second time period, thus allowing dislodged insects to be caught on a 2 ft x 2 ft screen held downstream. Samples were preserved in 70 percent isopropyl alcohol and transported to the lab for identification as to Order. Table 11 lists aquatic insects collected for each sample site and gives counts of organisms by Order during the study.

Aquatic insect fauna collected during a short time period at a given site does not indicate all of the different species which utilize the same habitat over a broad time period. Variation in life cycles, number of generations per year, and climatic seasonal changes all contribute to fluctuation in abundance and diversity of a specific aquatic insect at a given time. Collections of benthic invertebrates made during reconnaissance sampling in the Tract C-b drainage are useful as general indicators of the quality of aquatic habitat in the region relative to reproduction of aquatic fauna. Tract C-b drainage area is in an intensively used agricultural area, used primarily for cattle grazing. The large number of organisms collected at some sample sites in Tract C-b drainage (Table 11) indicates a very good production potential for aquatic

sampled highly unsuitable for a large gamefish population. This is especially true of Willow and Stewart creeks, which contained no game species at all. However, gamefish that were collected in Piceance Creek during reconnaissance sampling appeared healthy and in good shape. It is evident that the aquatic environments of Piceance, Willow and Stewart creeks favor less desirable but more highly adaptable non-game species such as the bluehead sucker and speckled dace. In a 2-year investigation of Piceance Creek, May (1970) found flannelmouth sucker, mottled sculpin, bonytail chub, black bullhead, red shiner, and mountain whitefish in addition to the species sampled by Woodward-Envicon, Inc. during this sampling in the Tract C-b drainage. However, Mr. May's investigations were more extensive and covered a significantly larger area than did the Tract C-b sampling, and it is expected his collections more nearly reflect the wide range of fish fauna existing in the varied habitats of the entire Piceance Creek.

The five-day fish investigations in the Tract C-b drainage were significantly hindered by high turbidity levels as a result of spring snow melt in the Piceance Basin. It was difficult to see the fish, especially smaller forms which had been stunned with the backpacker shocker. It is certain that bottom-hugging forms such as sculpins were shocked but never seen and hence never collected. A repeat sample effort at a low-water period, preferably late summer, would allow a more efficient collection of fish samples in the Tract C-b drainage, and eliminate the turbidity problem.

Periphyton. Due to cold water temperatures and high, silt-laden spring flows, periphyton growth in Piceance, Willow, and lower Stewart creeks was nearly non-existent. The periphyton samples were mixed with a great deal of detritus from the stream bottoms.

Analysis of the samples indicated the presence of clean water types of algae. The three streams sampled adjacent to Tract C-b had similar populations of periphyton. Diatoms predominated, while only one genus

of filamentous green algae (Chlorophyta) and one genus of filamentous blue-green algae (Cyanophyta) were found. In addition, Stewart Creek and Willow Creek contained submerged vascular plants. Higher plants were absent from Piceance Creek, probably due to the turbulent flow and silt load that was carried by the creek at the time of sampling. The periphyton found are listed in Table 13.

References

1. E.P.A., National Environmental Research Center Analytical Quality Control Lab. 1971. *Methods for Chemical Analysis of Water and Wastes.* Cincinnati, Ohio.
2. American Public Health Association. *Standard Methods for the Examination of Water and Wastewater.* Washington, D.C.
3. May, Bruce. 1970. *Biota and Chemistry of Piceance Creek.* Masters Thesis, Colorado State University. p. 67.

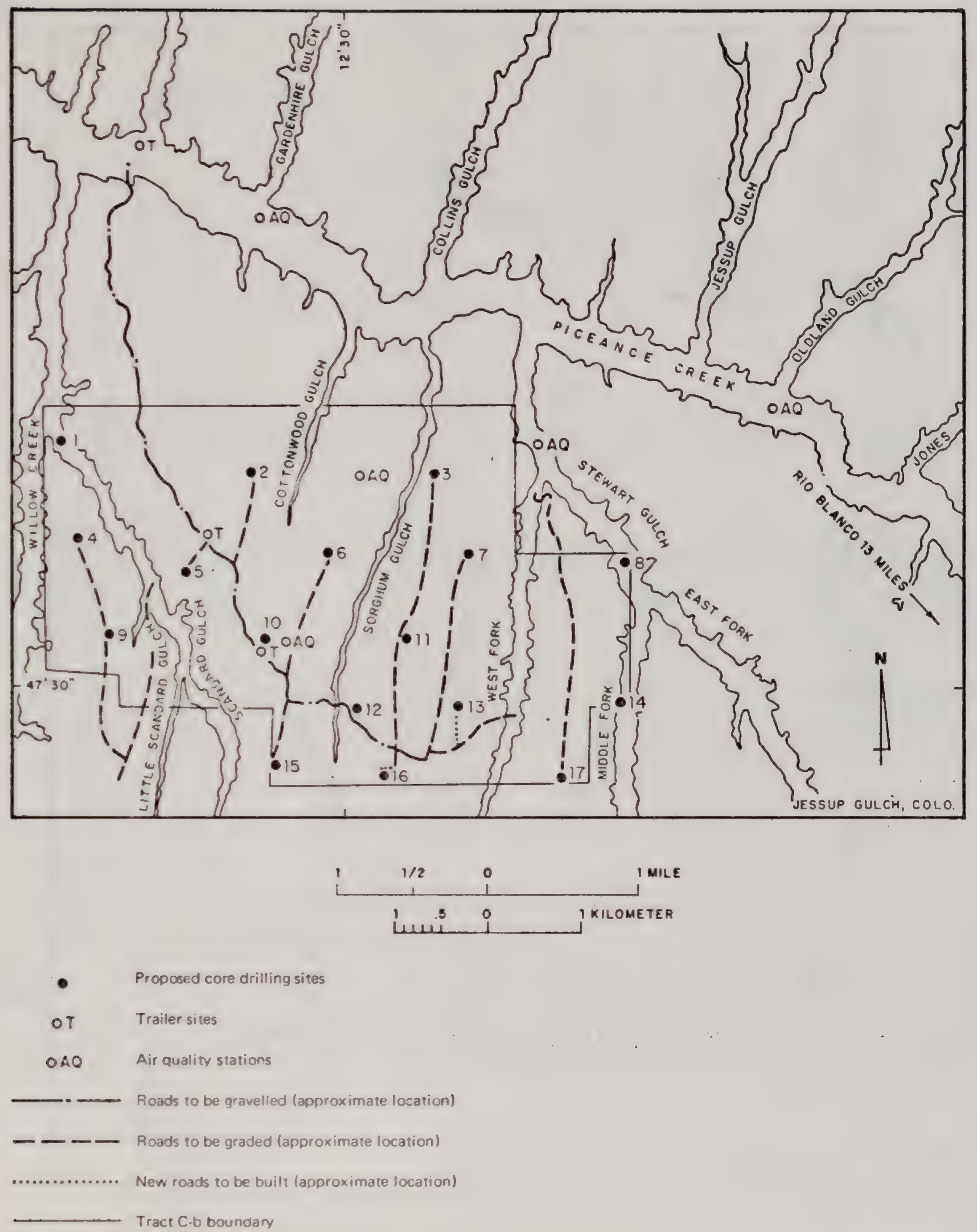

GARDENHIRE GULCH
12'30"
COLLINS GULCH
JESSUP GULCH
OLDLAND GULCH
PICEANCE CREEK
COTTONWOOD GULCH
WILLOW CREEK
STEWART GULCH
JONES
RIO BLANCO 13 MILES
EAST FORK
SORGHUM GULCH
WEST FORK
MIDDLE FORK
LITTLE SCANDARD GULCH
SCANDARD GULCH
47'30"
N
JESSUP GULCH, COLO.
OT
OAQ
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
1 1/2 0 1 MILE
1 .5 0 1 KILOMETER
Proposed core drilling sites
OT Trailer sites
OAQ Air quality stations
Roads to be gravelled (approximate location)
Roads to be graded (approximate location)
New roads to be built (approximate location)
Tract C-b boundary

Figure 1. Location of proposed drilling, air quality monitoring and trailer sites

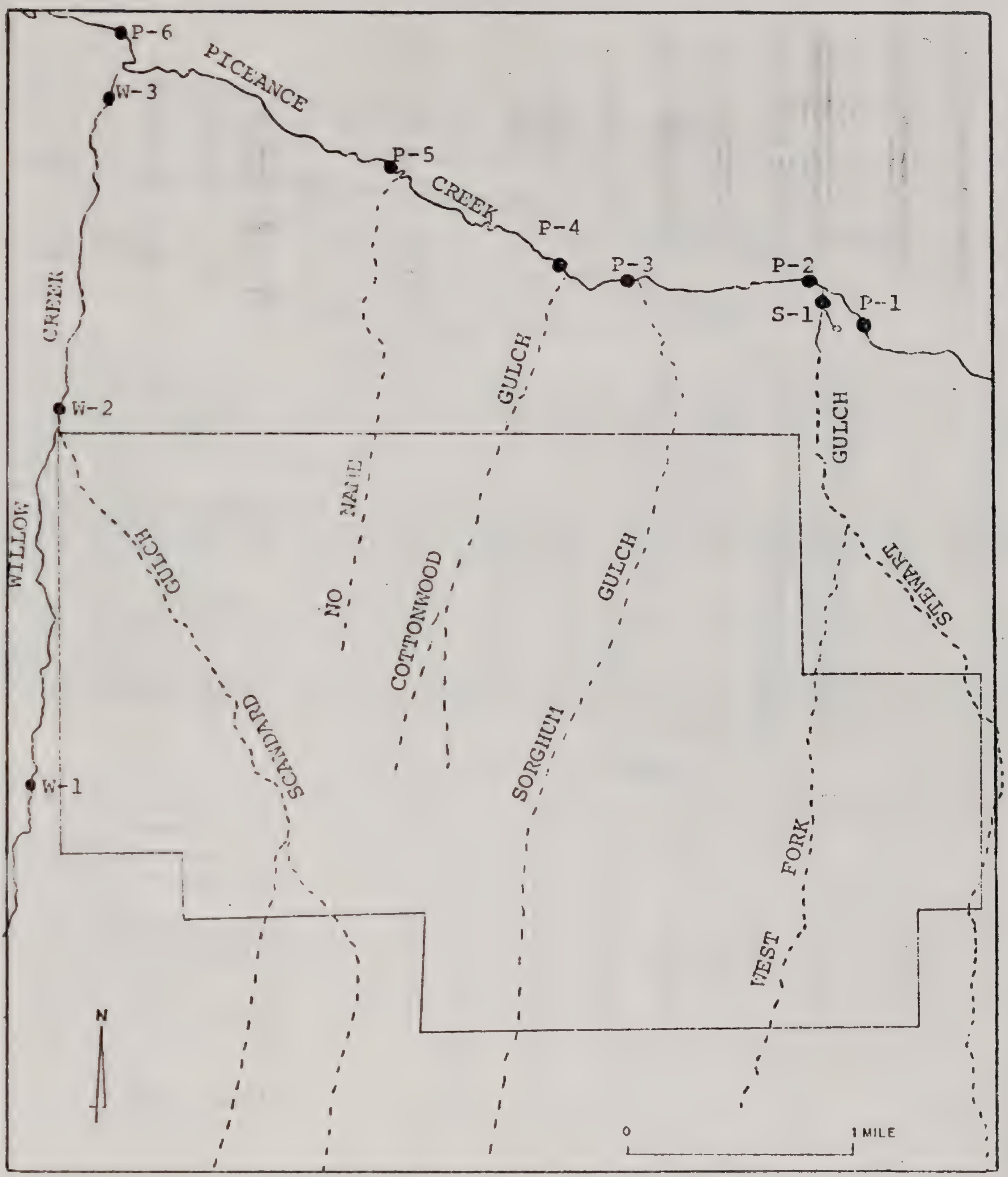

P-6
W-3
PICEANCE
P-5
CREEK
P-4
P-3
P-2
S-1
P-1
CREEK
W-2
WILLOW
GULCH
NO NAME
GULCH
COTTONWOOD
GULCH
SORGHUM
GULCH
STEWART
GULCH
SCANDARD
W-1
WEST FORK
N
0
1 MILE

Figure 2. Aquatic sampling stations for Tract C-b predisturbance investigations

Table 1. FREQUENCY, COVER, AND DENSITY VALUES FOR SHRUB SPECIES ENCOUNTERED IN THE LINE-STRIP SAMPLES. VALUES ARE BASED ON FOUR 100-FT LINE-STRINGS AT EACH DRILLING SITE.

Species	Drilling Site Number					
	5	6	11	14	15	17
	% Frequency					
Amelanchier sp.	---	---	75	---	100	100
Artemisia tridentata	100	100	100	100	25	50
Cercocarpus montanus	50	---	---	---	100	100
Chrysothamnus nauseosus	---	---	25	100	75	75
Chrysothamnus viscidiflorus	---	75	100	50	25	---
Eurotia lanata	---	---	---	100	25	---
Juniperus osteosperma (tree)	---	---	---	---	---	25
J. osteosperma (sapling)	100	50	75	---	75	75
Opuntia polyacantha	75	---	25	---	25	---
Pinus edulis (tree)	---	---	---	---	25	---
Pinus edulis (sapling)	25	25	100	---	100	100
Purshia tridentata	50	---	25	---	25	100
Quercus gambelii	---	---	---	---	50	25
Symphoricarpos oreophilus	100	---	50	---	100	100
Tetradymia canescens	---	---	---	---	25	---
	% Cover					
Amelanchier sp.	--	--	<1	--	1	1
Artemisia tridentata	5	5	4	10	<1	2
Cercocarpus montanus	<1	--	--	--	4	<1
Chrysothamnus nauseosus	--	--	<1	<1	<1	<1
Chrysothamnus viscidiflorus	--	<1	<1	<1	<1	--
Eurotia lanata	--	--	--	1	<1	--
Juniperus osteosperma (tree)	--	--	--	--	--	3*
J. osteosperma (sapling)	<1	<1	1	--	2	3
Opuntia polyacantha	<1	--	<1	--	<1	--
Pinus edulis (tree)	--	--	--	--	7*	8*
Pinus edulis (sapling)	<1	<1	1	--	3	2
Purshia tridentata	<1	--	<1	--	<1	1
Quercus gambelii	--	--	--	--	5	2
Symphoricarpos oreophilus	3	--	<1	--	2	9
Tetradymia canescens	--	--	--	--	<1	--
**Total	9	5	7	11	18	20

Table 1. (Continued)

Species	5	6	11	14	15	17
	Density (Individuals/Acre)					
Amelanchier sp.	---	---	160	---	820	490
Artemisia tridentata	2040	3760	2020	5350	20	550
Cercocarpus montanus	160	---	---	---	930	270
Chrysothamnus nauseosus	---	---	50	330	130	160
Chrysothamnus viscidiflorus	---	350	270	110	80	---
Eurotia lanata	---	---	---	3490	20	---
Juniperus osteosperma (tree)	---	---	---	---	---	20
J. osteosperma (sapling)	130	110	130	---	130	160
Opuntia polyacantha	80	---	20	---	50	---
Pinus edulis (tree)	---	---	---	---	20	---
Pinus edulis (sapling)	80	20	270	---	510	180
Purshia tridentata	50	---	50	---	20	350
Quercus gambelii	---	---	---	---	780	110
Symphoricarpos oreophilus	1090	---	110	---	1090	3380
Tetradymia canescens	---	---	---	---	50	---
Number of Species	7	4	9	4	13	10

*Canopy cover

**For cover, 4 times (<1) = 1%

Table 2. FREQUENCY VALUES FOR HERBACEOUS SPECIES ENCOUNTERED IN THE QUADRAT SAMPLES (values based on 5 one-centare quadrats)

Species	Percent Frequency Drilling Site Number					
	5	6	11	14	15	17
Agoseris glauca	40	100	80	--	20	60
Agropyron smithii	20	100	40	60	--	100
Agropyron sp.	--	--	--	--	20	--
Antennaria parvifolia	--	100	20	--	20	--
Antennaria rosea	--	--	--	--	--	60
Arabis sp.	--	20	20	--	--	20
Artemisia frigida	--	--	--	20	--	--
Astragalus spp.	20	--	60	--	20	40
Bouteloua gracilis	--	--	--	80	--	--
Bromus tectorum	40	--	60	100	--	--
Calochortus sp.	--	100	40	--	--	20
Carex pennsylvannica (?)	--	80	40	--	--	--
Carex sp.	--	--	--	--	--	40
Comandra umbellata	--	--	80	--	--	20
Cymopterus sp. (?)	--	--	--	--	40	20
Delphinium nelsoni	--	--	--	--	--	20
Descurainia pinnata	--	--	--	20	--	--
Erigeron sp.	--	60	20	--	--	20
Gutierrezia sp. (?)	--	--	--	--	80	--
Haplopappus nutallii	--	--	--	--	20	--
Lappula redowskii	20	--	60	80	--	60
Lepidium montanum	--	--	--	60	--	--
Lomatium sp. (?)	--	--	20	--	--	--
Lupinus sp.	--	--	40	--	--	--
Oryzopsis hymenoides	60	--	--	--	80	--
Phacelia sp.	20	--	--	--	--	--
Phlox hoodii	20	100	60	40	80	80
Phlox longifolia	--	80	40	--	20	40
Pinus edulis (seedling)	20	--	--	--	--	--
Poa fendleriana	60	20	--	--	--	100
Poa spp.	--	100	100	--	20	--
Senecio sp.	20	--	--	--	--	20
Sisymbrium altissimum	--	--	--	20	--	--
Sitanion longifolium	80	--	40	--	60	--
Sphaeralcea coccinea	--	100	--	20	20	--
Taraxacum officinale	20	--	40	40	--	20
Tragopogon dubius	20	--	--	--	--	--
Zygadenus venenosus	--	--	40	--	--	20
Unknown Cruciferae	--	--	60	--	--	--
Unknown Gramineae	--	--	--	40	--	--
Unknown Scrophulariaceae	60	--	--	--	--	--
Unknown Umbelliferae	--	100	--	--	--	--
Unknown forb seedling	--	--	--	20	--	--
Mosses	--	20	20	40	20	40
Average herbaceous cover	23%	23%	20%	30%	21%	30%
Number of species	15	13	20	13	13	18

Table 3. SPECIES OBSERVED IN THE PINYON-JUNIPER WOODLAND (DRILLING SITE 17)

Agoseris glauca
Agropyron smithii
Amelanchier alnifolia (?)
Antennaria rosea
Arabis sp.
Artemisia tridentata
Astragalus spp.
Balsamorhiza sagittata
Calochortus sp.
Carex sp.
Cercocarpus montanus
Chrysothamnus nauseosus
Comandra umbellata
Cymopterus sp.
Delphinium nelsoni
Erigeron sp.
Juniperus osteosperma
Lappula redowskii
Opuntia polyacantha
Phlox hoodii
Phlox longifolia
Pinus edulis
Poa fendleriana
Purshia tridentata
Quercus gambelii
Symphoricarpos oreophilus
Taraxacum officinale
Zygadenus venenosus
Senecio sp.

Table 4. SPECIES OBSERVED ON CHAINED PINYON-JUNIPER SITES (DRILLING SITES 2, 3, 4, 5, 7, 9, 11, 12, 13, and 15)

Agoseris glauca
Agropyron smithii
Amelanchier alnifolia (?)
Androsace septentrionalis
Antennaria parvifolia
Antennaria rosea
Arabis sp.
Artemisia dracunculus
Artemisia tridentata
Astragalus (5 species)
Balsamorhiza sagitatta
Bouteloua gracilis
Bromus tectorum
Calochortus sp.
Carex pennsylvanica (?)
Carex sp.
Castilleja linariaefolia
Cercocarpus montanus
Chrysothamnus nauseosus
Chrysothamnus viscidiflorus
Comandra umbellata
Cryptantha sp.
Cymopterus montanus (?)
Delphinium nelsoni
Erigeron sp.
Eurotia lanata
Haplopappus nuttallii
Ipomopsis aggregata
Juniperus osteosperma (sapling)
Lappula redowskii
Lomatium sp. (?)
Lupinus sp.
Opuntia polyacantha
Oryzopsis hymenoides
Phacelia idahoensis (?)
Phlox hoodii
Phlox longifolia
Physaria floribunda
Poa fendleriana
Pinus edulis (sapling)

Table 4. (Continued)

Purshia tridentata
Quercus gambelii
Rhus trilobata
Senecio sp.
Sitanion longifolium
Sphaeralcea coccinea
Symphoricarpos oreophilus
Taraxacum officinale
Tetradymia canescens
Townsendia hookeri
Tragopogon dubius
Yucca glauca
Zygadenus venenosus
Senecio multilobatus

Table 5. SPECIES OBSERVED IN THE RIDGETOP SAGEBRUSH COMMUNITY (DRILLING SITES 6, 10, 16, AND THE AQUIFER TEST SITE)

Agoseris glauca
Agropyron smithii
Antennaria parvifolia
Arabis sp.
Artemisia tridentata
Calochortus sp.
Carex sp.
Castilleja linariaefolia
Chrysothamnus nauseosus
Chrysothamnus viscidiflorus
Delphinium nelsoni
Erigeron sp.
Juniperus osteosperma (sapling)
Lomatium sp. (?)
Lupinus sp.
Malcolmia africana
Phlox hoodii
Phlox longifolia
Pinus edulis (sapling)
Poa fendleriana
Poa sp.
Sphaeralcea coccinea
Stipa comata
Trifolium gymnocarpon

Table 6. SPECIES OBSERVED IN THE VALLEY FLOOR SAGEBRUSH COMMUNITY (DRILLING SITES 1 AND 4)

Agropyron smithii
Artemisia frigida
Artemisia tridentata
Bouteloua gracilis
Bromus tectorum
Chrysothamnus viscidiflorus
Chrysothamnus nauseosus
Descurainia pinnata
Eurotia lanata
Lappula redowskii
Lepidium montanum
Phlox longifolia
Physaria floribunda
Sisymbrium altissimum
Sphaeralcea coccinea
Taraxacum officinale

Table 7. SPECIES OBSERVED IN A VALLEY FLOOR PASTURE (DRILLING SITE 8)

Artemisia dracunculus	*Chrysothamnus nauseosus*
Artemisia frigida	*Delphinium nelsoni*
Artemisia tridentata	*Grindelia squarrosa*
Astragalus sp.	*Lappula redowskii*
Bouteloua gracilis	*Lepidium perfoliatum*
Bromus tectorum	*Sisymbrium altissimum*

Table 8. DEER PELLET COUNTS

Drill Site	No. of Pellet Groups
5	23
6	5
11	21
14	12
15	15
17	30

Note: Clusters of deer pellets were counted in twelve randomly located quadrats (20x20 ft) on each of six drill site locations. Numbers of pellet groups suggest extent of habitat utilization.

Elk droppings were observed at three locations: near drill sites 4, 9, and 14.

Table 9. SPECIES OF BIRDS AND MAMMALS IDENTIFIED FROM MAY 13 THROUGH MAY 15, 1974, ON TRACT C-b (Species listed in phylogenetic order)

Birds observed below 6500 ft	Birds observed above 6500 ft
mallard	red-tailed hawk
golden eagle	swainson's hawk
raven	turkey vulture
magpie	sparrow hawk
mourning dove	goshawk hawk
white-throated swift	red-shafted flicker
violet-green swallow	raven
rough-winged swallow	pinyon jay
cliff swallow	clark's nutcracker
barn swallow	mourning dove
western kingbird	sage thrasher
empidonax flycatcher	robin
myarcus flycatcher	mountain bluebird
hummingbird (?)	green-tailed towhee
brewer's blackbird	
red-winged blackbird	
robin	
mountain bluebird	
green-tailed towhee	

Mammals observed below 6500 ft	Mammals observed above 6500 ft
yellow-bellied marmot	coyote
pocket gopher *(T. talpoides?)*	golden-mantled ground squirrel
muskrat	chipmunk *(E. minimus?)*
mule deer	pocket gopher *(T. talpoides?)*
	woodrat *(N. cinerea?)*
	cottontail *(S. nuttallii?)*
	elk
	mule deer

Table 10. WATER QUALITY FOR TRACT C-b DRAINAGE

Station	Depth (in.)	Width (ft)	Temp. (^oF)	pH	Total alkalinity (mg/ℓ)	CO_2 (mg/ℓ)	Specific cond. (μMHOS/cm)	Dissolved Oxygen (mg/ℓ)	Total Hardness (mg/ℓ)	Total Iron (mg/ℓ)	Ammonia Nitrogen (N) (mg/ℓ)	Nitrate as N (mg/ℓ)	Nitrite as N (mg/ℓ)	Ortho-Phosphate as (PO_4) (mg/ℓ)	Turbidity (FTU)	Date (1974)
P-1	13	12	58	9.3	475	0.0	980	9.0	310	0.8	0.1	6.0	0	1.1	430	5/12
P-3	12	15	52	9.2	370	28	950	9.0	310	0.7	0.6	3.0	0	1.1	160	5/13
P-6	15	15	48	9.2	460	0.0	1230	9.0	390	0.4	0.1	6.0	0	0.6	110	5/13
W-1	6	2	47	9.2	450	0	1340	7.0	570	0.0	0.8	0.8	0	0.6	15	5/14
W-3	4	2	52	9.2	490	68	1450	6.0	730	0.1	0.7	0.7	0	7.2	10	5/13
S-1	3	5	63	9.1	440	56	1400	7.0	515	0.2	1.1	2.5	0	1.2	40	5/14

Table 11. SUMMARY OF BENTHIC INVERTEBRATE COLLECTIONS FROM TRACT C-b DRAINAGE

	Sampling Stations										Totals
	P-1	P-2	P-3	P-4	P-5	P-6	W-1	W-2	W-3	S-1	
Plecoptera (Stoneflies)	44	2	89	24	14	116	23	275	9	2	598
Epheroptera (Mayflies)	237	39	257	307	147	587	249	431	122	12	2388
Trichoptera (Caddis flies)	466	11	618	234	76	83	20	2			1510
Diptera (True flies)	36	6	25	9	27	11	12	25	79	12	242
Odonata (Dragonflies & Damselflies)	1			1				5			7
Coleoptera (Beetles)	6		12	37	5	14		14			88
Hemiptera (True bugs)	1						4	1		1	7
Amphipoda (Scuds)					1		6	119	1		127
Annelida (Worms, Leeches & Polychaetes)		3		1				5	1		10
Gastropoda (Snails)					1			10	11		22
											4999

Table 12. SUMMARY OF FISH COLLECTIONS FROM TRACT C-b DRAINAGE

Station	Species[a]	Number Collected	Range in Length (mm)	Average Length (mm)
P-1	R.T.	1		525.0
	Brk. T.	6	184-288	246.0
	B.S.	3	86-90	89.0
	S.D.	2	54-69	61.5
P-2	Brk. T.	6	180-309	272.0
	B.S.	5	87-160	129.0
	S.D.	1		63.0
P-3	Brk. T.	3	203-290	239.0
	B.S.	11	70-133	90.0
	S.D.	11	60-93	71.0
P-4	Brk. T.	2	295-329	312.0
	B.T.	1		170.0
	B.S.	7	69-152	98.0
	S.D.	4	66-68	67.0
P-5	B.S.	4	71-136	89.5
	S.D.	1		64.0

Table 12 (Continued)

Station	Species[a]	Number Collected	Range in Length (mm)	Average Length (mm)
P-6	Brk. T.	2	311-375	343.0
	B.T.	1		208.0
	B.S.	21	69-141	94.0
	S.D.	11	62-86	69.0
W-2	B.S.	2	112-117	115.0
S-1	B.S.	3	79-90	85.0
	Trout Larvae	1		

[a] Species Legend:

Rainbow Trout (R.T.) _Salmo gairdneri_
Brown Trout (B.T.) _Salmo trutta_
Brook Trout (Brk. T.) _Salvelinus fontinalis_
Bluehead Sucker (B.S.) _Catostomus discobolus_
Speckled Dace (S.D.) _Rhinichthys osculus_

Table 13. PRESENCE OF PERIPHYTON IN STREAMS ADJACENT TO TRACT C-b, PICEANCE BASIN (COLORADO)

Taxon	STATION S-1	 P-1	 P-3	 P-6	 W-1	 W-3
Bacillariophyceae						
(Diatoms)						
Meridion sp.				x	x	x
Nitzchia sp.	x	x	x	x	x	x
Diatoma sp.					x	x
Navicula sp.	x	x	x	x	x	x
Fragilaria sp.	x	x	x	x	x	x
Tabilaria sp.	x			x	x	x
Synedra sp.	x	x	x	x		
Cymbella sp.		x	x	x		
Chlorophyta						
(Green algae)						
Spirogyra sp.	x		x	x		x
Cyanophyta						
(Blue-green algae)						
Oscillatoria sp.	x		x	x		x
Trachaeta						
(Vascular plants)						
Salvinia sp.					x	x
Lemna sp.	x					
Nasturtium sp.					x	x

S = Stewart Creek; P = Piceance Creek; W = Willow Creek

Appendix A

RESUMES OF RECONNAISSANCE TEAM

Joe M. Merino

terrestrial and aquatic ecology;

Education

University of California, Riverside and California State University, San Diego: Doctoral Candidate, Ecology
Duke University: Marine Ecology
University of Wisconsin: Limnology
Brigham Young University: M.S. Zoology, 1967
Brigham Young University: B.A. Zoology, 1961

Professional history

Woodward-Envicon, Inc., San Diego, Ecologist, 1971-date.
Brigham Young University, Animal Ecologist, Center for Environmental Studies, June 1971 – September 1971.
Environmental Engineering Laboratory, San Diego, Consultant in Biology, 1969-71.
University of California, San Diego Medical School, Research in Cardiac Dynamics, 1969-70.
University of Wisconsin, Milwaukee, Laboratory assistant in General Zoology, 1967-69.
University of Wisconsin, Milwaukee, Project Assistant, Center for Great Lakes Studies, June 1968 – September 1968.
University of Wisconsin, Milwaukee, Graduate Advisor to NSF recipients, May 1968 – August 1968.
Brigham Young University, Zoology Department, AEC/BYU Ecology Project, 1965-67.
Brigham Young University, Zoology Department, Research assistant, 1959-61 and 1964-67.
Bureau of Commercial Fisheries, La Jolla, California, correlated fisheries to environmental conditions, 1958-59.

Representative projects

Research assistant for the AEC/BYU Ecology Project at Mercury, Nevada delineating desert plant and animal communities. Project assistant studying effects of harbor sediments on planktonic and benthic plant and animal species from the Great Lakes for Army Corps of Engineers. Consulting biologist on projects relating to discharge of power plant cooling water into San Diego Bay, San Diego; Los Angeles–Long Beach Harbor, Los Angeles, California; and into the Pacific Ocean at Carlsbad, California. Contributed to both terrestrial and aquatic environmental studies as an ecologist in Colorado, Utah, Arizona, and California for the Denver Water Board, the Navajo Project, and the LaJolla Beach and Tennis Club.

Honors

National Defense Education Act, Fellowship, 1971-72.
Center for Great Lakes Studies, Fellowship, 1967-69.
National Science Foundation, Fellowship, 1967.

Affiliations

Western Society for Malacologists, 1972.
Southern California Academy of Sciences, 1971.

Publications

"A Study of the Effects of Water Discharge to South San Diego Bay from the Clair Engle Desalting Plant". With R. L. Chambers. Technical Report SD-9-73, 1972.

"Ecological effects of power station cooling water discharge in South San Diego Bay during February—March 1971". With R. L. Chambers and R. F. Ford. Technical Report P.O. No. C-821, 1971.

"Ecological effects of power station cooling water discharge in South San Diego Bay during August 1970". With R. L. Chambers and R. F. Ford. Technical Report P.O. No. C-821, 1970.

"Food and Color Preference in the House Sparrow (Passer domesticus)." Manuscript in preparation.

"Notes on the Biology of Dissodactylus calmani Rathbun 1918 (Decapoda-Pinnotheridae)." Manuscript in preparation.

"Biological Observations on the Scorpions of a Grassland Community in Southern Utah." Manuscript in preparation.

"Notes on Dissodactylus borradailei Rathbun 1918 (Decapoda-Pinnotheridae), a Commensal on the Heart Urchin, Meoma ventricosa L." Submitted to Crustaceana.

"Ticks of the Genus Haemaphysalis in the Western United States." (BYU Zoology and Entomology), Thesis for M.S. Degree.

RESUME

Warren R. Keammerer

Born: November 25, 1946

Present Position: Research Ecologist - Stoecker-Keammerer & Assoc.
Ecological Consultants

Education:

Capital University
Columbus, Ohio
1964-1968
B.S. cum laude

North Dakota State University
Fargo, North Dakota
1968-1972
Ph.D. 1972
(Plant Ecology)

Awards and Scholarships:

Student Participant, The American Museum of Natural History -- NSF Undergraduate Research Program at the Kalbfleisch Field Research Station, Suffolk County, New York.
Summers 1967 and 1968

National Defense Education Act Fellowship at North Dakota State University 1968-1971

Professional Affiliations:

Ecological Society of America
The British Ecological Society
The Society of the Sigma Xi
American Institute of Biological Sciences
The Wilderness Society
The Nature Conservancy

Research History:

Summers 1967 and 1968. NSF student participant in vegetation studies at the Kalbfleisch Field Research Station. The research projects were designed for study of old field succession, forest ecology, pattern analysis, the effects of fire on old fields and forest understory, and the effects of selective application of sylvicide on succession in old fields.

1968-1971. Thesis research project which was designed to determine the structure and composition of forests along the Missouri River in North Dakota. Through ordination and gradient analysis techniques, relationships between plant species, communities, and environmental parameters were determined.

1972-1973. Post-doctoral research fellowship at the University of Colorado, Institute of Arctic and Alpine Research. Research work

focused on the anticipated environmental impacts resulting from a winter cloud seeding program in the San Juan Mountains of Colorado.

1973-Present. Ecological Consultant to various companies including:

Atlantic Richfield Company
Colony Development Operation
Cornell Howland, Hays & Merryfield, Clair A. Hill & Associates
Colorado Public Service Company

Most of my recent research work has been conducted in the oil shale region of west-central Colorado. The studies have been designed to provide baseline ecological data for the regional vegetation which can be used in prediction of environmental impacts resulting from development of the oil shale resource.

Teaching Experience:

1964-1968. Undergraduate laboratory assistant in ecology, general biology, and vertebrate morphology.

1968-1971. Laboratory instructor in general biology, general botany, plant ecology, and plant systematics.

1971-1972. Lecturer in Biology at Capital University, Columbus, Ohio - Introductory biology, general ecology, and general botany.

1973. Lecturer in Biology at the University of Colorado, Boulder - Advanced classification of flowering plants.

Publications:

Keammerer, W. R. and W. C. Johnson. 1970. The vegetation of the Missouri River floodplain forests. Proc. of the N. D. Acad. Sci. 24(I), abstracts.

Keammerer, W. R. 1972. The understory vegetation of the bottomland forests of the Missouri River in North Dakota. Ph.D. thesis, North Dakota State University, Fargo. 234p.

Keammerer, W. R. and P. J. Webber (compilers). 1973. The vegetation continuum: a collection of readings. Manuscript.

Keammerer, W. R. 1974. *Sullivantia purpusii* and *Astragalus lutosus* in Garfield County, Colorado. Pro. of Colo.-Wyo. Acad. Sci. (Abstract)

Keammerer, W. R., W. C. Johnson, and R. L. Burgess. 1974. Floristic analysis of the Missouri River bottomland forests in North Dakota. Submitted to the American Midland Naturalist.

Burgess, R. L., W. C. Johnson, and W. R. Keammerer. 1973. Vegetation of the Missouri River floodplain in North Dakota. Research Project Technical Completion Report #WI-221-018-73. North Dakota Water Resources Research Institute, Fargo. 162p.

Johnson, W. C., R. L. Burgess, and W. R. Keammerer. 1974. Forest overstory vegetation on the Missouri floodplain in North Dakota. Submitted to Ecological Monographs.

Consulting Reports:

Keammerer, W. R. 1974. The vegetation of Parachute Creek Valley. Report to Colony Development Operation, Denver, Colorado.

Keammerer, W. R. 1974. The vegetation of the Grand Valley Area. Report to Colony Development Operation, Denver, Colorado.

Keammerer, W. R. and R. E. Stoecker. 1974. Preliminary report on the vegetation and wildlife of Colorado oil shale tract C-b. Report to Woodward-Envicon, Inc., San Diego, Cal.

Stoecker, R. E. and W. R. Keammerer. 1974. Powerline environmental analysis of Parachute Creek Valley. Report to Public Service Company of Colorado.

Stoecker, R. E. and W. R. Keammerer. 1974. The ecology of Boulder Creek: environmental inventory and evaluation of sewage treatment alternatives. Report to Cornell, Howland, Hayes, & Merryfield; Clair A. Hill & Associates, Denver, Colorado. 51p.

CURRICULUM VITAE

Robert E. Stoecker, Ph.D.
Animal Ecologist

Stoecker- Keammerer & Assoc.
Ecological Consultants
395 30th Street
Boulder, Colorado 80303

Phone: (303) 443-9647
or (303) 494-7642

Education:

1960-61 - University of Missouri Resident Center, St. Louis, Missouri.
1961-62 - Washington University, St. Louis, Missouri.
1962-65 - University of Missouri, Columbia, Missouri B.A. Degree 1965.
1965-67 - Montana State University, Bozeman, Montana M.S. Degree 1967.
1967-70 - University of Colorado, Boulder, Colorado Ph.D. Degree 1970.

Teaching Experience:

Animal Ecology 443 - 1972, University of Colorado, Boulder, 4 credit course.
Biology 100 - 1972, University of Colorado, Boulder.

Present University Affiliation:

Professor Adjoint - Department of Biology, University of Colorado, Boulder.

Research Interests:

Predator-prey relations
Hunting and kill behavior among mammalian and avian predators
Competitive exclusion
Alpine ecology
Social structures of mammalian populations

Consultant Experience:

1970-71 Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois - Environmental impact analysis of proposed nuclear power plants on terrestrial fauna.

1971-74 Bureau of Reclamation - Environmental impact of weather modification on alpine fauna.

Consultant Experience (continued)

1972	Army Corps of Engineers - Analysis of terrestrial fauna in relation to flood control on Boulder Creek, Boulder, Colorado.
1972	Flatirons Sand and Gravel Co. - Fauna of the White Rocks vicinity. Boulder, Colorado. 20 p.
1973-74	Geoecology Associates, Boulder, Colorado - Environmental impact of community development along the Colorado River near Grand Valley, Colorado.
1973-74	Geoecology Associates, Boulder, Colorado - Environmental impact of a proposed utilities corridor along Parachute Creek, Garfield County, Colorado.
1973-74	Atlantic Richfield Co. - Preparation of final impact statement on proposed oil shale mining operation in the Piceance Basin near Grand Valley, Colorado.
1974	Public Service Company of Colorado, Denver, Colorado - Powerline environmental analysis of Parachute Creek Valley.
1974	CH_2M Hill Associates - The Ecology of Boulder Creek: environmental inventory and evaluation of sewage treatment alternatives. Boulder, Colorado. 51 p.

Publications:

Stoecker, R.E. and C.E. Bock. 1971. The effects of weather modification on animals in the alpine tundra. The San Juan Ecology Project. Colorado State University, Department of Watershed Sciences, pp. 191-219.

Stoecker, R.E. 1972. Animal distributions in relation to snow in alpine tundra. The San Juan Ecology Project. Colorado State University, Department of Watershed Sciences, pp. 66-74.

Stoecker, R.E. 1972. Competitive relations between sympatric populations of voles (*Microtus montanus* and *M. pennsylvanicus*). Journal of Animal Ecology 41: 311-329.

Stoecker, R.E. 1974. Coyote predation on sheep in northwestern Colorado. Journal of Colorado-Wyoming Academy of Science.

Publications (continued)

Stoecker, R.E. and N. Cain. (in progress). Biogeomorphic relationships of pocket gophers (Thomomys talpoides) in alpine tundra. Journal of Arctic and Alpine Research.

Stoecker, R.E. (in progress). Kill technique of the African silver-backed jackal (Canis mesomelas). Journal of Mammology.

Stoecker, R.E. (in progress). Tracks of Mammals of the United States. Western Publishing Company, New York.

Walter R. Odening

terrestrial ecology;
botany; zoology

Education

Duke University: Ph.D. Botany, 1971
University of California, Riverside: Biology.
San Diego State University: M.S. Biology, 1968.
San Diego State University: B.S. Biology, 1963.

Professional history

Woodward-Envicon, Inc., San Diego, California, Staff Scientist, 1973-date.
Environmental Consultant, 1972-73.
Grossmont College, El Cajon, California, Biology Instructor, 1973.
University of Michigan, Assistant Professor of Resource Ecology, 1971-72.
Duke University, Durham, *North Carolina, Postdoctoral Research Associate, 1970-71.*
Duke University, Durham, *North Carolina, Research Assistant, 1969-70.*
University of California, Riverside, California, Teaching Assistant, Biology, 1968.
San Diego State University, San Diego, California, Teaching Assistant, Biology and Zoology, 1965-67.
San Diego State University, San Diego, California, Research Assistant, 1964-67.
U.S. Food and Drug Administration, Los Angeles District, Inspector, 1963-64.
U.S. Navy, Engineering Aide, Surveyor II, 1959-61.

Representative projects

Dr. Odening has conducted a variety of environmental programs concerned with terrestrial ecology. In addition to major contributions on environmental impact studies for water supply and land development projects in southern California, he has conducted specific studies in ecology in the transverse and peninsular ranges of that area and in the White Mountains of the central California area. He has also participated in ecological studies of the deciduous forest biome and desert areas. The desert studies emphasized the physiology and taxonomy of desert shrubs.

Honors

Biomedical Sciences, Support Grant Research Traineeship, Duke University, 1970.

Affiliations

Ecological Society of America.
American Association for the Advancement of Science.
American Society of Plant Physiologists.
American Institute of Biological Science.
San Diego County, Off-Road Vehicle Advisory Committee.

Publications

"Tissue Water Potential, Photosynthesis, ^{14}C Labeled Photosynthate Utilization and Growth in the Desert Shrub Larrea divaricata *cav.," Oechel, W.C., B.R. Strain and W.R. Odening, Ecological Monographs 42 (2) 127-141, 1972.*

"Photosynthesis Rates of a Desert Shrub Larrea divaricata *cav. under Field Conditions," Oechel, W.C., B.R. Strain and W.R. Odening,* Photosynthetica *6 (2) 183-188, 1972.*

"The Effects of Decreasing Water Potential on Net CO_2 Exchange of Intact Desert Shrubs," Odening, W.R., B.R. Strain and W.C. Oechel, accepted by Ecology *(currently under revision).*

"Negative Pressure Potentials in Larrea divaricata *cav. and Their Possible Ecological Significance," Odening, W.R., B.R. Strain and W.C. Oechel. Presented to AAAS 1971, Abstract published in* Bulletin of Ecological Society of America, *1971.*

"The Effects of Transitory and Extended Periods of Cloud Cover on Net CO_2 Exchange in Loblolly Pine," Odening, W.R., J. Mulroy and B.R. Strain. Presented to AAAS 1971, Abstract published in Bulletin of Ecological Society of America, *1971.*

"Light Acclimation Potential in Loblolly Pine," Odening, W.R., J. Mulroy and B.R. Strain, Photosynthetica.

"Negative Pressure Potentials (Turgor Pressures) in the Creosote Bush Larrea divaricata *cav.," Odening, W.R., B.R. Strain and W.C. Oechel,* Canadian J. of Botany.

Steven J. Puttmann

Education

Colorado State University: M.S. Fishery Biology, 1973.
Colorado State University: B.S. Fishery Biology, 1971.

Professional history

Woodward-Envicon, Inc., Fisheries Biologist, 1973-date.
Colorado State University, Graduate Research Assistant, 1971-73.
Alaska Department of Fish and Game, Fishery Technician, 1969, 1970.

Representative projects

Mr. Puttmann was involved in graduate research for the Colorado Division of Wildlife on artificial propagation and management of the walleye in eastern Colorado irrigation impoundments, and on artificial diet training for smallmouth bass. In addition, he participated in several environmental impact analyses. The analyses evaluated the Eagle-Piney Water Diversion Project in Colorado and the Homestake Reservoir Extension Project, and the Gulf-Interstate Natural Gas Pipeline Project in Oregon, Nevada and California. On the Eagle-Piney Project, his work involved inventories of benthic invertebrates and analysis of fish population density and diversity. The inventories focused on dam sites and tributary streams for several diversion configurations. Final reports were submitted for impact analysis. The Homestake Extension activity included inventories of benthic invertebrates and fish population density and diversity for major tributaries of the Homestake watershed. A dam site had been proposed to supply additional water to the cities of Colorado Springs and Aurora. His work on the Gulf-Interstate pipeline involved a thorough literature review, compilation of the data available, and preparation of the environmental impact reports for the sections of the pipeline in lower Oregon, Nevada, and California.

Affiliations

American Fisheries Society.
American Association for Advancement of Science.
Trout Unlimited.
Bass Anglers Sportsman Society.

Publications

"Artificial Diet Training for Smallmouth Bass," M.S. Thesis, Colorado State University, 1973.

Robin F. Knox

fisheries biology;
thermal effects studies

Education

University of Missouri: M.A. Fisheries, 1973.
University of Illinois: B.S. Zoology, 1968.

Professional history

Woodward-Envicon, Inc., Fisheries Biologist, 1973-date.
U.S. Army, Walter Reed Army Medical Center, Walter Reed Army Institute of Research, Biological Sciences Technician, 1969-71.

Representative projects

Mr. Knox conducted qualitative sampling of fish and aquatic invertebrates as part of an environmental impact study for a proposed water diversion plan in the Homestake Creek region of the upper Colorado River drainage basin.

Previous experience includes qualitative sampling of zooplankton, aquatic invertebrates, and fish in a steam-electric plant cooling reservoir on the Middle Fork of the Chariton River, Missouri. Graduate research on this reservoir included quantitative studies of the effects of thermal additions on the levels of lipid in various tissues, and the reproductive organs of the white crappie. Graduate field work included quantitative methods of benthos and plankton sampling, stomach analysis and collection of fishes.

Additional experience involved sampling of fish and invertebrates along the Atlantic Coast near the Indian River Inlet, Delaware, under the auspices of the U.S. Department of Agriculture graduate school; and sampling of fish and invertebrates in the Florida Keys region under the direction of the Department of Zoology, University of Illinois.

Affiliations

American Fisheries Society.
Georgia Professional Fisheries Workers Association.

Publications

"Alteration of Lipid Content of Tissues and Gonosomatic Indices of White Crappie by Thermal Additions in Thomas Hill Reservoir, Missouri," 1973.

"Evaluation of Environmental Alterations by Thermal Loading and Acid Pollution in the Cooling Reservoir of a Steam Electric Station," 1970.

William D. Clark

biology

Education

Colorado State University: B.S. Fishery Biology, 1971.

Professional history

Woodward-Envicon, Inc., Atlanta, Georgia, Fisheries Biologist, 1973-date.
National Fish Hatchery, Leadville, Colorado, Fish Hatchery Technician, 1972-73.
Peace Corps Training, University of Oklahoma Research Institute, Peace Corps Trainee, 1971.
Vermont Fish & Game Department, Swanton, Vermont, Biology Aide, 1970.

Representative projects

Mr. Clark was involved in the qualitative analysis of fish and aquatic invertebrates of the Homestake drainage basin in the Upper Colorado River basin, Redcliff, Colorado. Prior to that, he was associated with the chemical treatment of rainbow trout diseases and hatching of wild lake trout eggs at the National Fish Hatchery, Leadville, Colorado. Mr. Clark also received field training for intensive culture of carp for the Peace Corps, including field collection of wild fish in Lake Texohma on the Red River. He had also been involved in the field collection of a representative cross section of fish for mercury contamination studies in Lake Champlain and the drainages of the Lamoille, Mississquoi, and Winooski rivers for the Vermont Fish and Game Department.

Affiliations

National Wildlife Federation.

/ CH

WOODWARD-ENVICON, INC.

A SUBSIDIARY OF WOODWARD-CLYDE CONSULTANTS
1633 OLD BAYSHORE HIGHWAY, BURLINGAME, CA 94010 (415) 692-5310
MAIL ADDRESS: P. O. BOX 4187, BURLINGAME, CA 94010

July 3, 1974

Mr. H. M. Spence
Atlantic Richfield Company
2 Park Central Building
5th Floor
15th & Arapahoe
Denver, Colorado 80202

Dear Mr. Spence:

With reference to our telephone conversation today, I am writing to confirm that the pre-exploration environmental reconnaissance recently carried out by Woodward-Envicon, Inc. on Tract C-b covered the proposed trailer sites.

As you are aware, the report covering this reconnaissance is under preparation and will be forwarded to you on completion. However, in the meantime we confirm that our study team found your selection of trailer sites to be satisfactory from the environmental standpoint. It is anticipated that the impact on vegetation and wildlife of trailers located at the proposed sites will be negligible.

Sincerely,

CBatra

C. Batra
Program Manager,
Petroleum Industry

CB:ard

ENVIRONMENTAL CONSULTANTS

WOODWARD-ENVICON, INC.
A SUBSIDIARY OF WOODWARD-CLYDE CONSULTANTS
1633 OLD BAYSHORE HIGHWAY BURLINGAME, CA 94010 (415) 692-5310
• MAIL ADDRESS P. O. BOX 4187, BURLINGAME, CA 94010

August 16, 1974
74-669

Mr. H. M. Spence
Atlantic Richfield Company
Suite 555, 2 Park Central
15th & Arapahoe
Denver, Colorado 80202

Dear Mr. Spence:

In response to Ms. Carol Hopkins' request by letter dated August 2, 1974, our biological staff conducted a brief reconnaissance of additional sites and proposed roads, the locations of which are shown on the 2 maps enclosed with her letter.

Dr. Joe Merino, the head of our biological team, reports as follows on the findings of a 3 to 4 day reconnaissance carried out by plant and animal biologists on his team during the week of August 5, 1974.

Old Coreholes Cb-2 and Cb-4. These sites were inspected including an area within approximately 100 ft of the site and it was reported that carrying out exploratory work at these locations would be acceptable from an ecological standpoint.

Relocation of Roads to Proposed Coreholes SG-4 and SG-17. Relocation of roads to proposed coreholes SG-4 and SG-17 would involve grading previously undisturbed terrain in lateral draws leading to the ridges. These lateral draws support plant species which are characteristic of both protected and exposed terrain on the ridge slopes and narrow canyons. Mature trees are found along the proposed routes. However, the plant species are neither rare or unique.

No unique or rare animals occur at these locations. Deer, however, utilize these draws for movement between valley and ridge top. Disruption caused by road relocation per se would not have a long-term adverse effect on big game movement. From an ecological standpoint it would be preferable to improve existing roads to SG-4 and SG-17 than to build new roads over undisturbed terrain. However, if it is essential to relocate these roads, it is recommended that the Woodward-Envicon biological team at Tract C-b be asked to flag mature pinyon and juniper trees so that these are not cut down during the road construction activities.

Water Monitoring Well CH-18. The same comment applies to this site as for Old Coreholes Cb-2 and Cb-4 above.

Road to CH-18. We understand that it is necessary to improve the road to CH-18. In this connection it is recommended that mature, healthy trees en route be flagged by the Woodward-Envicon biological team at site so that these are not destroyed or damaged during construction activities. In addition, it was observed that several pinyon trees along this road have been killed by or are infected with bark beetles and their removal would be beneficial. Such trees should be flagged by the biologists for removal.

Alluvial Wells. The 11 alluvial well site locations encircled in green on one of the referenced maps were inspected in the same manner as Old Coreholes Cb-2 and Cb-4 with the exception of the site at the mouth of Sorghum Gulch. In the case of the latter, a total area within 500 ft. (instead of 100 ft.) was inspected as requested. It was reported that exploratory work at all 11 sites would be acceptable from an ecological standpoint.

Relocation of Corehole SG-17. Mr. Don Tait of Atlantic Richfield Company advised that for technical reasons location of the proposed Corehole SG-17 could only be moved a little from the original proposed location. The new proposed location was inspected by our team who advise that clearing should be restricted to the minimum area essential for the planned exploratory work. Further, it is recommended that extreme care be exercised during the clearing process in order to minimize impact on the pinyon-juniper woodland on this ridge.

If you have any questions pertaining to the above, please do not hesitate to call me.

Sincerely,

C Batra

C. Batra
Program Manager
Petroleum Industry

CB/jg
cc: Mr. A. J. Rogers
Ms. Carol A. Hopkins
Mr. Joe Merino

WOODWARD-ENVICON, INC.
A SUBSIDIARY OF WOODWARD-CLYDE CONSULTANTS
1633 OLD BAYSHORE HIGHWAY, BURLINGAME, CA 94010 (415) 692-5310
MAIL ADDRESS: P. O. BOX 4187, BURLINGAME, CA 94010

October 3, 1974
74-669

AIRMAIL

RECEIVED
OCT 7 1974
M. J. REDDING

Dr. Martin Redding
Atlantic Richfield Company
Two Park Central, Suite 555
1515 Arapahoe Street
Denver, Colorado 80202

Dear Dr. Redding:

In response to Ms. Carol Hopkins' request by letter dated September 19, 1974, Dr. Joe Merino, the head of our biological team, conducted a brief reconnaissance of additional sites and segments of roads, the locations of which are shown on the two maps enclosed with her letter.

Dr. Merino reports as follows:

ON-TRACT SITES

Old Coreholes On-Tract

The old coreholes on-Tract, Cb-1, Cb-3, 71-1 and 71-2, are showing signs of partial revegetation. Coreholes Cb-1 and Cb-3 apparently have been reseeded with grasses, but a large percentage of vegetative cover is composed of mustards and other annuals. Young shrubs are not plentiful, but their presence indicates revegetation. Coreholes 71-1 and 71-2 are located in the valley floors, and the dominant cover at these sites is Russian thistle, Salsola sp. Some young sagebrush exists, along with some grasses, which demonstrates natural revegetation.

Opening these old coreholes for exploratory work should not have a significant adverse effect on the surrounding area from an ecological standpoint. However, it is recommended that before activity begins, our vegetation team should visit each site and quantitatively assess the extent of revegetation. This will provide some basis, although limited, for estimating rates of natural revegetation on the Tract.

Aquifer Test Site

The area surrounding the aquifer test site is primarily downed pinyon-juniper with shrubs as an understory. Large numbers of saplings of both pinyon pine and juniper exist (approximately 50-60 per acre)

in this area. Scrub oak, bitterbrush, mountain mahogany and serviceberry are also plentiful in the area and are important browse species for big game. Additionally, small pockets of yucca occur on the west and northwest edges of the aquifer test site. The yucca is not widespread in the area and therefore may be of some academic interest. However, it is not a rare species.

From signs present, this area is used as winter feeding ground by big game and possibly livestock. If an area within a radius of 1/4 mile of the aquifer site were denuded of vegetation, or if its productivity is decreased significantly, then this portion of winter range would be eliminated for deer use and its impact could be significant during lean years.

OFF-TRACT SITES AND ROADS

Roads

Road construction between Sorgum Gulch and Cottonwood Gulch, Piceance Creek and Sorgum Gulch and Piceance Creek and Cottonwood Gulch will cause no significant damage to the natural vegetation. However, its impact on the pasture lands had best be assessed by the farmers that may be affected by this activity.

Old Coreholes Off-Tract

Old coreholes 71-3, TG2-1 and TG2-2 are similar in appearance to 71-1 and 71-2 discussed above, but with less Russian thistle. Some natural revegetation has taken place with native shrub species. Corehole Fed 2-b is similar to the Cb-1 and Cb-3 described above. Old corehole 71-5 was not visited because of a locked gate approximately 1-1/2 miles from the site which precluded entry.

As in the case of the old coreholes on-Tract, opening these off-Tract coreholes for exploratory work should not have a significant adverse effect on the surrounding area from an ecological standpoint. However, it is recommended that before activity begins, our vegetation team should visit each site and quantitatively assess the extent of revegetation. This will provide some basis, although limited, for estimating rates of natural revegetation in the area.

If you have any questions pertaining to the above, please do not hesitate to call me.

Sincerely,

CBatra

C. Batra
Program Manager
Petroleum Industry

CB/cc
cc: A.J. Rogers
Carol A. Hopkins
Joe Merino

WOODWARD-ENVICON, INC.
A SUBSIDIARY OF WOODWARD-CLYDE CONSULTANTS
1633 OLD BAYSHORE HIGHWAY, SUITE 205, BURLINGAME, (415) 692-5310
MAIL ADDRESS: P. O. BOX 4187, BURLINGAME, CA 94010

December 3, 1974

AIRMAIL (74-669)

Dr. Martin Redding
Atlantic Richfield Company
Two Park Central
1515 Arapahoe Street
Denver, Colorado 80202

Dear Dr. Redding:

During the week of November 18, 1974, Woodward-Envicon biological personnel were asked by Ms. Joan Gibbs to conduct a reconnaissance of a proposed drill site, SG21, to determine its environmental suitability for exploratory drilling. Below is a report of their findings.

The proposed drill site lies on the west side of Scandard Gulch, approximately one-half mile south of the C-b Tract boundary. The area of the drill site has been sprayed with a herbicide in order to kill the sagebrush which is the major component of the gulch habitat. The spraying procedure was about 50 percent effective, as there are still many live sagebrush plants interspersed among the dead shrubs.

The herbaceous ground cover in the site area appeared to be nearly 30 percent. The dominant species present is cheatgrass, Bromus tectorum. Additional grass species present include Indian rice grass, Oryzopsis hymenoides; wheatgrass, Agropyron sp.; and Great Basin wild rye, Elymus cinereus. The grasses in the site area are used primarily by cattle, although some deer and rabbit use was also noted.

The rocky hillside immediately to the west of the drill site is an entirely different habitat composed of pinyon pine, juniper trees, and many shrubs commonly browsed by deer, such as bitterbrush, service berry, and mountain mahogany. Other shrubs, such as snowberry, are also present.

From gross observations, it appears that no rare species are present at the site. The common small mammals, such as deer mice and cottontail rabbits, are plentiful. The dens of the bushy-tailed pack rat are present on the ridges. Deer trails cross the area, and deer sign are evident throughout.

Construction and drilling activity will probably impact this site minimally. Of course, some small mammals will be destroyed and others will be displaced with possible death ensuing. The longer term impacts will be removal of vegetation and its attendant fauna.

Disturbance to deer should be minimal and only during construction and drilling activities. At other times, they should be free to move about unhindered.

Species List of Plants Present at Proposed Drill Site

Shrubs and Trees

Amelanchier alnifolia	Service berry
Artemisia tridentata	Sagebrush
Cercocarpus montanus	Mountain mahogany
Chrysothamnus nauseosus	Rabbitbrush
Juniperus osteosperma	Utah juniper
Juniperus scopulorum	Rocky Mountain juniper
Opuntia polyacantha	Prickly pear
Purshia tridentata	Bitterbrush
Quercus gambelii	Gamel's oak
Symphoricarpos oreophilus	Snowberry

Herbaceous Plants

Artemisia frigida	Pasture sage
Artemisia ludoviciana	Sagewort
Aster sp.	Aster
Bouteloua gracilis	Blue grama
Bromus tectorum	Cheatgrass
Chenopodium sp.	Lamb's quarters
Cleome serrulata	Rocky Mountain beeplant
Elymus cinereus	Great Basin wild rye
Eriogonum sp.	Eriogonum
Lepidium montanum	Peppergrass
Oryzopsis hymenoides	Rice grass
Physaria floribunda	Double bladder pod

If you have any questions pertaining to the above report, please call Joe Merino or me.

Sincerely,

CBatra

C. Batra
Program Manager
Petroleum Industry

CB/cc

cc: Carol Hopkins, ARCO/Denver
Joan Gibbs, ARCO/Denver
Joe Merino, WEI/San Diego

ARCHAEOLOGICAL

REPORT ON THE ARCHAEOLOGICAL INVENTORY OF THE EXPLORATORY DRILLING SITES AND ASSOCIATED ROADS, Cb OIL SHALE LEASE TRACT

Calvin H. Jennings
Department of Anthropology
Colorado State University

April 29, 1974

Abstract: The seventeen core drill sites, aquifer test site and associated roads in the Cb oil shale lease tract, Rio Blanco County, Colorado, were examined for cultural resources with negative results.

Purpose

The goal of this study was to determine the nature of the cultural resources present in the vicinity of the exploratory drill sites and other areas associated with the initial development of the Cb tract mining operation. The study was undertaken to meet the spirit of the lease requirements for the protection of the area's cultural resources.

Methods

Each drill site was individually examined on foot. Indications of cultural resources sought included surface scatters of artifacts, architectural remains, and vegetation or topographic anomalies.

The roads were only given spot checking in areas which were undisturbed by chaining of the pinyon-juniper, which were sheltered, had a reasonably sizeable flat area, and close access to water. This strategy was adopted because a party under the supervision of Jennings had previously reconnoitered the tract in July, 1973, and found no evidence of historic or prehistoric occupation.

Results

No prehistoric or historic sites were found at any of the drill sites or at the aquifer test site. No sites were found on any of the roads, either planned or existing. One site, 5 RB 69, was located during the 1973 reconnaissance in T.2S, R.97W., NW¼ of NW¼ of Section 36. This site will in no way be endangered by the exploratory drilling program.

Impact on Cultural Resources

On the grounds of the foregoing results no impact is seen for any antiquities in the prosectuion of the exploratory drilling program in the Cb tract. Consequently, no mitigating action is recommended.

One cautionary note should be made here. The estimate of the impact on cultural resources in the Cb tract is based exclusively on data collected from the present ground surface. It is possible, though not likely, that there are deeply buried sites in the drainages and that surface indications of sites on the ridge tops may have been destroyed by the range improvement operations of the Bureau of Land Management. Consequently, undiscovered sites may appear during development. If unanticipated sites are encountered by contractor personnel during the drilling program, the following actions should be taken.

1. Halt all operations which will have the effect of furthering destruction of the archaeological site such as bull dozing or grading. Drilling will not constitute a problem.

2. Do not attempt to collect materials from undisturbed portions of a site or from the banks of excavations. However, noting the existence of such material is to be encouraged. An observant equipment operator may do much to speed up the resumption of activities.

3. Notify a qualified professional archaeologist immediately. The archaeologist may be able to recommend the resumption of construction work without an on-site examination if he is given information on the nature of the site. This information should include the depth of the culture bearing deposits, the color and texture of the deposits, the spatial relationship between the impact area and the site area, the kinds of artifacts or relics found, and the nature of any features such as fire pits, depressions or other stationary objects associated with the site.

If the contractor takes the foregoing actions and protects a site from perhaps well-intentioned but nonetheless destructive activities of his personnel, a minimum of damage to the cultural resource and of delay to the project should result. It is not uncommon for contractors to fail to report finding antiquities because of a fear of complications to their effort resulting from salvage. It is emphasized here that the competent professional archaeologist has no more desire to see construction projects delayed than does the contractor. Such an archaeologist will make every effort to achieve a useful compromise between the contractor's needs and the needs of cultural resource conservation.

Department of Anthropology
Laboratory of Public Archaeology

Colorado State University
Fort Collins, Colorado
80523

July 18, 1974

Ms. Carol Hopkins
Atlantic-Richfield Co.
2 Park Central Building
Room 555
1515 Arapahoe Street
Denver, Colorado 80202

Dear Carol:

This is to inform you that an archaeological reconnaissance of the support facility area has been made. The area examined is located in T.3S., R.97W., Sec. 12, SW1/4 of NE1/4 at the junction of the main tract and the core hole #5 roads. The extent of the area examined was 600 ft. x 300 ft. with the long axis paralleling the main tract road (roughly northwest to southeast) and abutting the road on its northern margin.

The results of the reconnaissance were entirely negative. Not only did we find no sites worthy of inclusion in the National Register of Historic Places, we find no sites whatsoever. Consequently, we recommend that the locality described above be used as the support facility area, as no cultural resources are endangered by such use of the locality.

Sincerely,

Calvin H. Jennings

Calvin H. Jennings
Assistant Professor

cc: Don Bruns, Craig District, BLM
Steve Howard, White River Resource Area, BLM
Gene Miller, State Office, BLM

CHJ: cjs

cc:
HMS
L Kelly w/ map?

Department of Anthropology
Laboratory of Public Archaeology

Colorado State University
Fort Collins, Colorado
80523

July 24, 1974

Ms. Carol Hopkins
Atlantic-Richfield Co.
1 515 Arapaho Street Rm. 555
Denver, Colorado 80202

Dear Carol:

This is to report to you the results of our examination of the relocated Core Hole 6, the "Plant Site Air Quality Monitoring Station", and the portion of the powerline passing just to the west of Core Hole 6 between poles 27 and 35 on July 20, 1974. This locality is in T.3S., R.96W., Section 7, SE 1/4 of NW 1/4 and SW 1/4 of NE 1/4. We also attempted to locate Core Hole 7 but were unable to do so on that date.

We found no sites to be endangered by Core Hole 6, the air quality monitoring station, or the section of the associated powerline described above. Consequently, use of these localities is recommended from the archaeological point of view.

In our search for Core Hole 7 we did encounter one small site very nearly in the center of Section 5 (T.3S., R.96W). The site, designated 5 RB 136 and described on the attached sheet, is not of National Register significance. However, in the event that any development is planned for the area indicated on the attached map, I would appreciate notification so that the site may be investigated more fully, insuring documentation of its contents prior to any disturbance.

Also enclosed is a copy of the tract map indicating the areas already examined for archaeological remains as a part of the Cb exploratory program. This is provided at the request of Mike Spence and will be updated as we complete the examination of the other tract facilities.

Sincerely,

CaC

Calvin H. Jennings
Associate Professor

CHJ/apm
Enclosures 4
cc Don Bruns, Craig District, BLM
Steve Howard, White River Resource Area, BLM
Gene Miller, State Office, BLM

Midland Hotel
Rifle, Colorado
August 9, 1974

Ms. Carol Hopkins
Atlantic-Richfield Co.
1515 Arapahoe St., Rm. 555
Denver, Colorado 80202

Dear Carol:

This is to report to you on the status of archaeological clearences for various aspects of the Cb oil shale tract exploratory program.

The following localities have been examined and cleared on archaeological grounds:

1. MET/SPARE tower, SW¼ of SW¼ of SW¼ of Section 7.
2. Core hole SG-7, near the center of Section 7.
3. Air Quality stations, all locations.
4. "A" series drill sites #1-13.
5. Core hole SG-18.
6. Water Quality stations, all locations.
7. SG-18 road.
8. New alignments of the SG-4 and SG-17 roads.
9. All power line alignments.

No archaeological sites were found to be endangered by planned developments at the above noted locations. We did as you suggested and examined the entire mouth of Sorghum Gulch and found nothing in the locality. Consequently, I feel justified to say that no sites of significance will be endangered by the Cb tract exploration.

You should be advised that we have recorded another small site near the northeastern corner of the tract. The site, 5RB146, is located just north of the ¼ section monument on the boundary between Sections 5 and 8. I will send you a copy of our site record form when I get access to a xerox machine. We also have located another site on the western side of the tract in the SW¼ of the SE¼ of Section 2. Neither of these sites is endangered under current development plans but their existence should be kept in mind when changes in the present plans are considered or when expansion of the tract development takes place.

This is also to inform you that I am removing my crew from the field we have apparently reached the end of our usefullness to the exploratory program. After August 11 I can be reached through either my home phone (493-6919) or the Anthropology Department at CSU (491-5447). I will be out of town from August 16 through August 27.

Sincerely,

Calvin H. Jennings

Calvin H. Jennings

CSU

Department of Anthropology
Laboratory of Public Archaeology

Colorado State University
Fort Collins, Colorado
80523

September 11, 1974

Ms. Carol Hopkins
Atlantic Richfield Co.
1515 Arapahoe St., Rm. 555
Denver, Colorado

Dear Carol:

In response to your telephone request of this date for information on antiquities that might be present in the vicinity of the road connecting the tract with the Picenace Creek road and of the Cb-1 core hole I can inform you that no sites are endangered in either locality. There are no sites ate all in the vicinity of the Cb-1 core hole. A small chipping station was recorded about 200 meters northwest of the road on the rim of the terrace overlooking the Piceance Creek flood plain during our reconnaisance of the tract area in 1973. re-examination of the locality during the 1974 field season produced no new information and the site clearly has no value in terms of the National Register. In addition, its distance from your construction activities indicates no real danger to it.

From the point-of-view of archaeological conservation there is no reason why your projects for these two localities cannot be undertaken.

Sincerely,

Calvin H. Jennings

Calvin H. Jennings,
Director

CHJ

Department of Anthropology
Laboratory of Public Archaeology

Colorado State University
Fort Collins, Colorado
80523

September 25, 1974

Ms. Carol Hopkins
Atlantic Richfield Co.
1515 Arapahoe Rm. 555
Denver, Colorado 80202

Dear Carol:

This is to transmit to you our report on the most recent set of localities to be subjected to examination for antiquities. This set was given to us by telephone on September 11. The field work was carried out by G. A. Bair between September 17 and 22.

Please let me know if you have any questions regarding this report. Copies of the report will be circulated to the Bureau of Land Management and National Park Service as required by our antiquities permit.

Sincerely,

Calvin H. Jennings

Calvin H. Jennings
Director

CHJ/apm
Enclosure

Archaeological clearance surveys were conducted at a series of proposed well sites which are part of the C-b Tract exploratory program WR 74-7. This work was carried out under United States Department of Interior Antiquities Act Permit 74-CO-055 during the period 17 September to 22 September, 1974. A total of 30 and 1/2 field hours were required to perform the necessary duties, or just under four man-days. An additional two hours were spent writing, editing, and typing the present statement.

No significant archaeological remains or sites of National Register quality were encountered at or in the immediate vicinity of the proposed well sites or along the road alignments described below:

1. Well Cb-3 NE corner of C-b Tract in Section 5 (T.3S; R.96W) between archaeological sites 5RB136 and 5 RB146. This well location will utilize an existing pad.
2. Well 71-1 SW corner of C-b Tract in Scandard Gulch NE 1/4 of NW 1/4, Section 13 (T.3S; R.97W). Well located in sagebrush bottom.
3. Well 71-2 SE corner of C-b Tract in West Fork of Stewart Gulch, NE 1/4 of NE 1/4, Section 17 (T.3S; R.96W). Well located in sagebrush bottom.
4. Well 71-3 South of C-b Tract in West Fork of Stewart Gulch, NW 1/4 of NW 1/4, Section 29 (T.3S; R.96W). Sagebrush bottomlands.
5. Well 71-5 SE of C-b Tract in Middle Fork of Stewart Gulch in NE 1/4 of Section 33 (T.3S; R.96W), east of the road at the mouth of a major tributary to Middle Fork. Well will utilize an existing pad.
6. Well TG2-1 SE of C-b Tract at confluences of East and West Twin Gulches with Middle Fork of Stewart Gulch. South center of Section 21 (T.3S; R.96W). Well is located in area presently under agriculture.
7. Well TG3-2 SE of C-b Tract on East Fork of Stewart Gulch in Section 23 (T.3S; R.96W). Sagebrush bottomlands.

8.	Well Fed. 2-B	East of C-b Tract in vicinity of spot elevation 7256, SW 1/4 of NE 1/4, Section 10 (T.3S; R.96W). High ridge covered with pinon-juniper forest. Access road not specified or cleared.
9.	Aquifer Test	On C-b Tract, center of Section 7 (T.3S; R.96W). An area of one-quarter mile was conducted around the entire site. Site located in chained timber area.
10.	Road	Cottonwood Gulch to Sorghum Gulch, utilizing an existing trail along the base of the escarpment between the two drainages. Northern edge of C-b Tract in Sections 5 and 6 (T.3S; R.96W). Base of slope in sagebrush and directly adjacent to private agricultural lands.
11.	Roads	Access to well sites which cross Piceance Creek from Section 32 (T.2S; R.96W) south to Section 5 (T.3S; R.96W) and from Section 31 (T.2S; R.96W) south to Section 6 (T.3S; R.96W). These roads cross private agricultural lands.

With the exception of the access road to Well Fed. 2-B, it is recommended that archaeological clearance be granted for all the above locations.

Gerald A. Bair, Field Archaeologist

Calvin H. Jennings, Project Director

Laboratory of Public Archaeology
Department of Anthropology
Colorado State University
Fort Collins, Colorado 80521

September 25, 1974

Department of Anthropology
Laboratory of Public Archaeology

Colorado State University
Fort Collins, Colorado
80523

November 15, 1974

Ms. Carol Hopkins
Atlantic Richfield Co.
1515 Arapahoe Rm. 555
Denver, Colorado 80202

Dear Carol:

Enclosed is our report on the survey of the SG-20 and -21 drill locations on the Cb Oil Shale Tract. As you will note, we found no evidence of any cultural resources at the locations and, therefore, nothing of archaeological or historical significance.

Thank you for sending us the USGS approval of the archaeological study plan. I see no problems in meeting their requirements.

I have not as yet received the paleontological specimens you told me about. I discussed the problem with the State Archaeologist and he feels that his office can take responsibility for passing them on to a qualified paleontologist. When they arrive here I will include them with our own specimens and send them on to Boulder.

Take care and have a nice Thanksgiving holiday.

Sincerely,

Cal

Calvin H. Jennings
Director

CHJ/apm
Enclosure

The following drill locations were inspected on November 1, 1974, and clearance is hereby granted by the Laboratory of Public Archaeology, Colorado ate University, Fort Collins.

SG-20 (T 3 S, R 96 W, Sec. 31 SW 1/4 of SE 1/4 approx.) Site is located at the mouth of Cottonwood Gulch and adjacent to a water monitoring station. No evidence of prehistoric activity.

SG-21. (T 3 S; R 97 W, Sec. 13 SW 1/4 of SE 1/4 approx.) South of tract in Scandard Gulch. Site is located in sagebrush bottom; however, arroyo cutting may necessitate removal of an area to the west of the present road alignment. No evidence of archaeological importance was found in the sagebrush, nor on the higher slopes on the west side of Scandard Gulch.

The above clearance was performed by two individuals with a total time of four hours including travel to and from Rifle, Colorado, or one man-day.

Submitted by:

Gerald A. Bair
Field Archaeologist

cc C. H. Jennings
Project Director

CSU

Department of Anthropology
Laboratory of Public Archaeology

Colorado State University
Fort Collins, Colorado
80523

November 18, 1974

Ms. Carol Hopkins
Atlantic Richfield Co.
1515 Arapahoe Rm. 555
Denver, Colorado 80202

Dear Carol:

In response to your query of November 18 concerning the examination of the road to well location SG-21, we have nothing to report. The alignment was examined and no antiquities were located. I am sorry for our oversight in omitting this information.

Sincerely,

Cal

Calvin H. Jennings
Director

CHJ/apm

ENVIRONMENTAL BASELINE
MONITORING PROGRAMS

Streams

Section II

Surface Water

The required collection of environmental data and monitoring programs for surface water was commenced April 23, 1974. Included in this section is all the data available as of November 30, 1974, for the Surface Water Program which consists of:

(1) surface water stream gauging and water quality analytical data
(2) inventory of natural surface features such as seeps and springs.

Much of the data presented is in supplement to that actually required by the Oil Shale Lease Environmental Stipulations. As defined by the Lease, water gauging stations are required on the major drainages of Tract C-b and, as defined by the Mining Supervisor, upstream and downstream of the Leased land. The Lease requires that records be maintained of all data collected which includes:

(1) continuous stream flow records
(2) continuous water temperature records
(3) continuous precipitation records
(4) continuous sediment records
(5) periodic analyses for selected inorganic and organic chemical constituents, as directed by the Mining Supervisor.

Presented in Table II A-1 of this section is a summary of all surface water requirements as defined by the Mining Supervisor. Tables II A-2 through II A-11 tabulate all actual data compiled including that not required by the Lease.

Although originally located in the Flora and Fauna section of the Oil Shale Lease Environmental Stipulations, the requirement for an inventory of natural surface features, such as seeps and springs, has been included as part of the Surface Water Program.

Following such an inventory, water quality samples were collected from each spring and seep identified. Although not required by the Lease, a complete water quality analysis was performed on each sample and the resulting data is tabulated in Table II A-12.

SECTION II

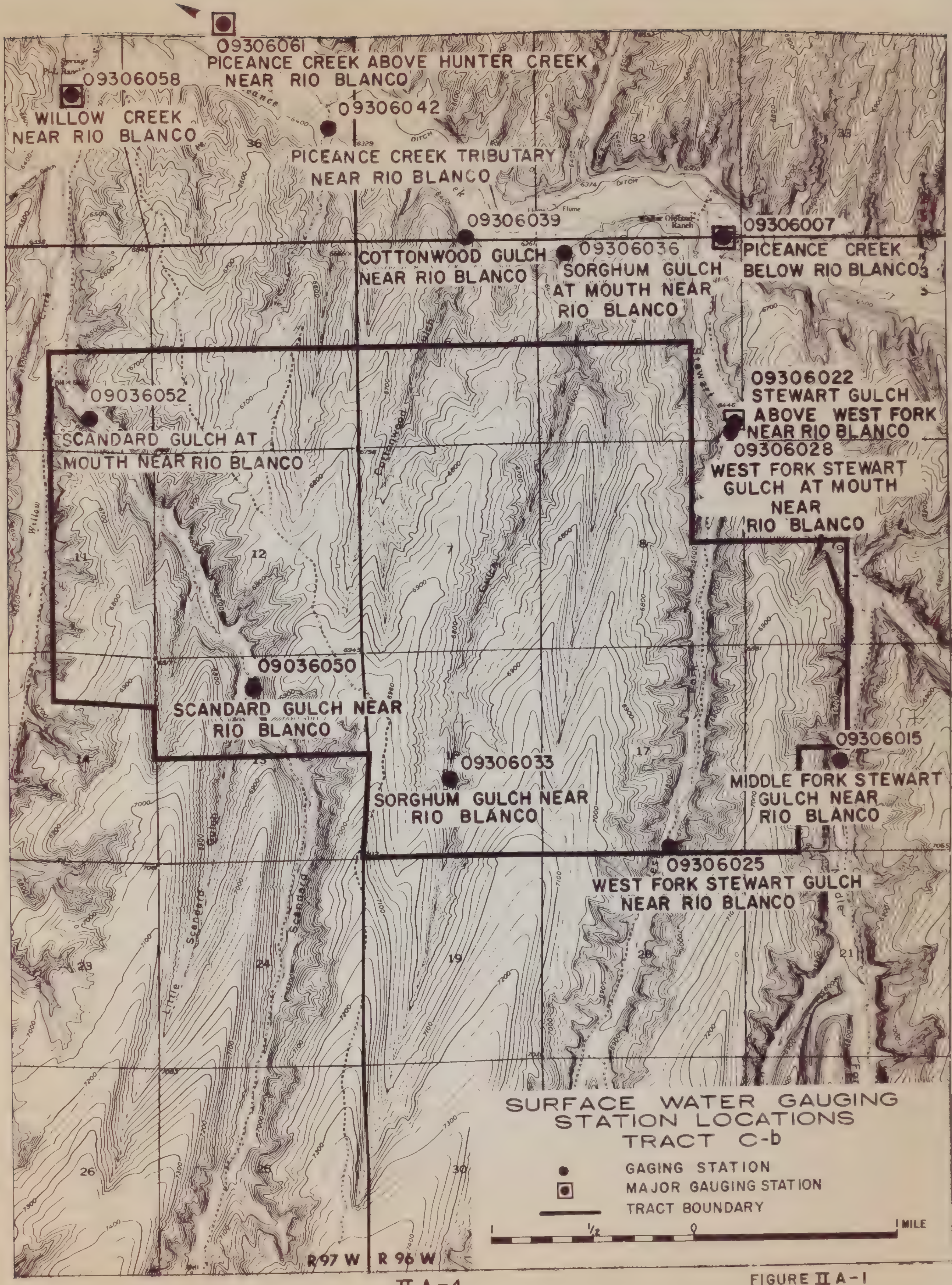
SURFACE WATER

DESCRIPTION OF CONTENTS

Table/Figure No.	Title/Description	Page No.
Fig. II-A-1	Surface Water Gauging Station Locations A map of the thirteen stream gauging stations installed in the spring of 1974 by the Colorado District, U.S.G.S. Water Resources Division, in cooperation with the Colorado River Water Conservation District. The U.S.G.S. Water Resources Division sub-district office in Meeker, Colorado, is currently operating and maintaining the stations, collecting water samples, and analyzing for water quality parameters. Nine of the gauging stations are located on ephemeral or intermittent streams. The other four, however, are located on perennial drainages and are considered major gauging stations. The correct station names and associated U.S.G.S. numbers are listed below. The major stations are designated with an asterisk. * (1) 09306007-Piceance Creek below Rio Blanco (2) 09306015-Middle Fork Stewart Gulch near Rio Blanco * (3) 09306022-Stewart Gulch ab West Fork near Rio Blanco (4) 09306025-West Fork Stewart Gulch near Rio Blanco (5) 09306028-West Fork Stewart Gulch at mouth near Rio Blanco (6) 09306033-Sorghum Gulch near Rio Blanco (7) 09306036-Sorghum Gulch at mouth near Rio Blanco (8) 09306039-Cottonwood Gulch near Rio Blanco (9) 09306042-Piceance Creek Tributary near Rio Blanco (10) 09306050-Scandard Gulch near Rio Blanco (11) 09306052-Scandard Gulch at mouth near Rio Blanco *(12) 09306058-Willow Creek near Rio Blanco *(13) 09306061-Piceance Creek ab Hunter Creek near Rio Blanco	II-A-4

Table/Figure No.	Title/Description	Page No.
---------------	Rain Gauge Data	II A-5
Table II-A-1	Surface Water Quality Analytical Program Requirements	II-A-6
Tables II-A-2- II-A-11	Water Quality Data Summary Tables A tabulation of data compiled from U.S.G.S. computer print-out sheets. The bulk of the data is from the four major gauging stations from which water quality samples are routinely collected and analyzed. Water samples are collected at the remaining stations every other week whenever flow occurs. The stations in addition to the major gauging stations for which data has been compiled include: (1) U.S.G.S. No. 09306025 (2) U.S.G.S. No. 09305030 (this station was later moved and renumbered U.S.G.S. No. 09305022) (3) U.S.G.S. 090306050	II A-7 through II A-16
--------------	U.S.G.S. Water Quality Computer Print-out Sheets - All stream water quality parameters are presented by gauging station. The Data Summary Tables II-A-2 through II-A-11 were generated from this bulk data.	II A-17 through II A-59
Fig. II-A-2	Seeps and Springs - a map of all seeps and springs located near Tract C-b. An inventory of local seeps and springs was conducted by field geologists. It was concluded that there are no major springs on Tract C-b. Water quality samples were collected, however, from all springs and seeps near the Tract and the data is included in this report.	II A-60
Table II-A-12	Seeps and Springs - Water Quality Analytical Program Summary Table	II A-61
--------------	Seeps and Springs - Laboratory Water Quality Analysis Sheets - Water samples from ten seeps and springs near C-b Tract were analyzed. Major and miner constituents were done by Industrial Laboratories, Denver, Colorado. Trace elements were done by Commercial Testing and Engineering, Golden, Colorado, and radioactivity was done by Hazen Research, Inc., Golden, Colorado. The data presented in Table II-A-12 was generated from this bulk data.	II A-62 through II A-85

Streams


09306061
PICEANCE CREEK ABOVE HUNTER CREEK
NEAR RIO BLANCO
09306058
WILLOW CREEK
NEAR RIO BLANCO
09306042
PICEANCE CREEK TRIBUTARY
NEAR RIO BLANCO
09306039
COTTONWOOD GULCH
NEAR RIO BLANCO
09306036
SORGHUM GULCH
AT MOUTH NEAR
RIO BLANCO
09306007
PICEANCE CREEK
BELOW RIO BLANCO
09036052
SCANDARD GULCH AT
MOUTH NEAR RIO BLANCO
09306022
STEWART GULCH
ABOVE WEST FORK
NEAR RIO BLANCO
09306028
WEST FORK STEWART
GULCH AT MOUTH
NEAR
RIO BLANCO
09036050
SCANDARD GULCH NEAR
RIO BLANCO
09306015
MIDDLE FORK STEWART
GULCH NEAR
RIO BLANCO
09306033
SORGHUM GULCH NEAR
RIO BLANCO
09306025
WEST FORK STEWART GULCH
NEAR RIO BLANCO
● GAGING STATION
MAJOR GAUGING STATION
TRACT BOUNDARY
1
1/2
0
1 MILE
R 97 W
R 96 W

SURFACE WATER GAUGING STATION LOCATIONS TRACT C-b

FIGURE II A-1

Rain Gauge Data

Four storage-type rain gauges were installed at four water gauging stations on Tract C-b during the fall of 1974. This was done to comply with requirements set forth by the Area Oil Shale Supervisor in August, 1974, to improve area precipitation coverage and continuous precipitation records. The stations at which such data is being collected are:

(1) USGS No. 09306022 Stewart Gulch above West Fork near Rio Blanco
(2) USGS No. 09306015 Middle Fork Stewart Gulch near Rio Blanco
(3) USGS No. 09306058 Willow Creek near Rio Blanco
(4) USGS. No. 09306050 Scandard Gulch near Rio Blanco.

In addition, precipitation data is being recorded at five air quality stations on or near the Tract. (See Section II C.)

The U.S.G.S., who operates and maintains the four gauges, has verbally reported that no precipitation events were recorded at these stations through November 30, 1974, the period of record for this report.

TABLE II A-1

SURFACE WATER QUALITY ANALYTICAL PROGRAM REQUIREMENTS

	Semi-Monthly	Quarterly	Continuous	Continuous When Possible
1. Ammonia	x			
2. Arsenic	x			
3. Barium	x			
4. Bicarbonate	x			
5. Boron	x			
6. Cadmium	x			
7. Calcium	x			
8. Carbonate	x			
9. Chloride	x			
10. Chromium	x			
11. COD		x(M)		
12. Coliform, Total & Fecal		x(M)		
13. Color	x			
14. Conductivity, Specific			x(M)	x(0)
15. Copper	x			
16. Cyanide	x			
17. Dissolved Oxygen	x		x(M)	
18. Fluoride	x			
19. Gross Alpha*		x(M)		
20. Gross Beta*		x(M)		
21. Iron	x			
22. Kjeldahl Nitrogen	x			
23. Lead	x			
24. Lithium	x			
25. Magnesium	x			
26. Manganese	x			
27. Mercury	x			
28. Nitrate	x			
29. Nitrite	x			
30. Odor	x			
31. Oil & Grease	x			
32. Ortho-Phosphate	x			
33. Pesticides		x(M)		
34. pH	x		x(M)	
35. Potassium	x			
36. Selenium	x			
37. Silica	x			
38. Sodium	x			
39. Solids, Dissolved	x			
40. Solids, Suspended (sediment)			x(M)	x(0)
41. Sulfate	x			
42. Sulfide	x			
43. Turbidity	x		x(PC)	
44. Zinc		x(M)		
45. Complete element scan for all trace elements		x(M)		
46. Total Organic Carbon (TOC)		x(M)		
If TOC > 10 mg/liter, then				
Dissolved Organic Carbon				
Suspended Organic Carbon				
Phenols				
Polycyclic Aromatics				
Sulfur (acid extraction)				
Nitrogen (base extraction)				
47. Stream Flow (discharge)			x(M)	x(0)
48. Water Temperature			x(M)	x(0)

* Depending on count, thorium 230, radium 226, and natural uranium may be required

(M) Major Gauging Stations Only.

(0) All Gauging Stations Except Major Stations.

(PC) Piceance Creek Gauging Stations Only.

TABLE II -A-2

Piceance Creek Below Rio Blanco, CO.
U.S.G.S. No. 09306007
. April - August, 1974

	4/23	5/3	5/17	5/22	5/31	6/14	6/21	6/26	7/2	7/11	7/20	8/3	8/10	[illegible]/31
(*)1. Alkalinity (mg/l)	374	358	423	491	492	476	[illegible]	481	506	481	[illegible]	488	408	
(*)2. Aluminum (ug/l)				60										
3. Aromatics, Polycyclic (ug/l)														
4. Arsenic (ug/l)			2	1	2	1	3	2	5	4	3	2	3	[illegible]
5. Barium (ug/l)				130	200	200	0	< 100	< 100	< 100	0	0	0	[illegible]
(*)6. Beryllium (ug/l)				<6										
7. Bicarbonate (mg/l)	456	436	516	599	600	580	576	587	617	[illegible]	441	595	[illegible]	
(*)8. Bismuth (ug/l)				<11										
9. Boron (ug/l)				200	240	250	260	250	250	280	260	240	[illegible]	[illegible]
10. Cadmium (ug/l)				0	1	0	1	2	0	1	1	1	<1	[illegible]
11. Carbonate (mg/l)	0	0	0	0	0	0	0	0	0	0	0	0	0	
(*)12. Carbon Dioxide (mg/l)	4.6	4.4	5.2	7.6	4.8	5.9	5.8	4.7	6.2	7.5	11.0	7.6	[illegible]	
13. Chloride (mg/l)	13	9.7	12	15	17	15	17	16	16	17	16	16	13	[illegible]
14. Chromium (ug/l)				< 8										
(*)15. Cobalt (ug/l)				<15										
16. COD (mg/l)														
17. Coliform, Total & Fecal (CL./100ml)														
18. Color (Pt-Co Scale)														
19. Conductivity, Specific (umho)	977	912	1080	1240	1220	1190	1200	1270	1250	1250	1030	1210	[illegible]	
20. Copper (ug/l)				<4	4	2	3	9	5	1	12	2	4	[illegible]
21. Cyanide (mg/l)														
22. Discharge (CFS)	25	34	12N	6.6	6.4	6.9N	7.0	7.3N	6.4	4.0	14	8.0N	[illegible]	[illegible]
23. Dissolved Oxygen (mg/l)														
24. Fluoride (mg/l)	1.3	.7	.8	.9	.9	1.0	.9	.9	.8	.2	.7	.9	.8	[illegible]
(*)25. Gallium (ug/l)				<8										
(*)26. Germanium (ug/l)				<16										
(*)27. Hardness (Ca, Mg) (mg/l)	340	320	380	410	410	400	390	400	420	410	340	390	350	[illegible]
(*)28. Hardness, Non-Carbonate (mg/l)	0	0	0	0	0	0	0	0	0	0	0	0	0	
29. Iron (ug/l)	110	40	40	300	30	40	20	40	50	50	150	90	50	[illegible]
30. Kjeldahl Nitrogen (mg/l)														
31. Lead (ug/l)				<16	5	7	8	7	1	4	3	4	2	[illegible]
32. Lithium (ug/l)				10	10	10	10	10	0	0	0	0	0	[illegible]
33. Magnesium (mg/l)	40	38	47	52	53	52	49	50	56	57	39	48	42	[illegible]
34. Manganese (ug/l)	30	10	100	210	140	40	180	200	230	180	140	180	70	[illegible]
35. Mercury (ug/l)			.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	[illegible]
(*)36. Molybdenum (ug/l)				6										
(*)37. Nickel (ug/l)				<8										
38. Nitrate (mg/l)														
39. Nitrite (mg/l)	.63	.70	.56	.28	.15	.08	.03	.04	.01	2.5	.47	.15	[illegible]	[illegible]
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)	.06	.03	.09	.12	.18	.06	.03	.06	.00	1.1	.12	.06	[illegible]	[illegible]
(*)43. Ortho-Phosphorus (mg/l)	.02	.01	.03	.04	.06	.02	.01	.02	.00	.36	.04	.02	.04	[illegible]
44. Pesticides (mg/l)														
45. pH	8.2	8.2	8.2	8.1	8.3	8.2	8.2	8.3	8.2	8.1	7.8	8.1	8.2	[illegible]
46. Potassium (mg/l)	2.7	3.1	3.4	2.9	4.3	3.7	3.4	4.1	3.5	3.8	5.7	3.9	[illegible]	[illegible]
47. Selenium (ug/l)			0	2	1	1	1	0	1	1	0	1	2	[illegible]
48. Silica (mg/l)	15	14	17	17	17	15	13	16	14	17	15	18	17	[illegible]
(*)49. Silver (ug/l)				<2										
50. Sodium (mg/l)	96	88	110	140	140	150	140	150	150	160	110	140	110	130
(*)51. Sodium Adsorption Ratio	2.3	2.1	2.5	3.0	3.0	3.3	3.1	3.3	3.2	3.4	2.6	3.1	2.6	[illegible]
(*)52. Sodium (%)	38	37	38	43	42	45	44	45	44	45	41	44	41	[illegible]
53. Solids, Dissolved (mg/l)	625	578	701	792	786	776	764	783	809	829	670	786	[illegible]	
54. Solids, Suspended														
(*)55. Strontium (ug/l)				1600										
56. Sulfate (mg/l)	160	140	180	190	180	180	180	180	190	200	190	190	170	[illegible]
57. Sulfide (mg/l)														
58. Temperature (°C)	10.0	7.5	9.0	11.0	15.0	19.0	19.0	16.0	10.5	22.0	20.0	13.0	14.0	[illegible]
(*)59. Tin (ug/l)				<11										
(*)60. Titanium (ug/l)				<8										
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)				<8										
63. Zinc (ug/l)				10	30	30	40	30	0	10	40	20	30	20
64. Zirconium (ug/l)				<24										
65. Calcium (mg/l)	69	66	74	77	76	73	76	76	74	72	73	75	69	[illegible]
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC > 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II A-3
Piceance Creek Below Rio Blanco, CO
U.S.G.S. No. 09306007
September - February, 1975

	9/12	9/20	9/27	10/4	10/23									
(*)1. Alkalinity (mg/l)		428	420											
(*)2. Aluminum (ug/l)														
3. Aromatics, Polycyclic (ug/l)														
4. Arsenic (ug/l)		2	2											
5. Barium (ug/l)		100	0											
(*)6. Beryllium (ug/l)														
7. Bicarbonate (ug/l)		522	502											
(*)8. Bismuth (ug/l)														
9. Boron (ug/l)		120	160											
10. Cadmium (ug/l)		1	<1											
11. Carbonate (mg/l)														
(*)12. Carbon Dioxide (mg/l)														
13. Chloride (mg/l)		16	13											
14. Chromium (ug/l)														
(*)15. Cobalt (ug/l)														
16. COD (mg/l)														
17. Coliform, Total & Fecal (Cl./100ml)														
18. Color														
19. Conductivity, Specific (u℧)		1080	1060											
20. Copper (ug/l)		1	0											
21. Cyanide (mg/l)														
22. Discharge (CFS)		7.1	8.1											
23. Dissolved Oxygen (mg/l)														
24. Fluoride (mg/l)		1.0	1.1											
(*)25. Gallium (ug/l)														
(*)26. Germanium (ug/l)														
(*)27. Hardness (Ca, Mg) (mg/l)		380	340											
(*)28. Hardness, Non-Carbonate (mg/l)		0	0											
29. Iron (ug/l)		30	120											
30. Kjeldahl Nitrogen (mg/l)														
31. Lead (ug/l)		4	2											
32. Lithium (ug/l)		0	0											
33. Magnesium (mg/l)		50	44											
34. Manganese (ug/l)		50	50											
35. Mercury (ug/l)		.0	.1											
(*)36. Molybdenum (ug/l)														
(*)37. Nickel (ug/l)														
38. Nitrate (mg/l)														
39. Nitrite (mg/l)		.23	.21											
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)		.06	.03											
(*)43. Ortho-Phosphorus (mg/l)		.02	.01											
44. Pesticides (ug/l)														
45. pH														
46. Potassium (mg/l)		4.2	3.2											
47. Selenium (ug/l)		1	1											
48. Silica (mg/l)		16	16											
(*)49. Silver (ug/l)														
50. Sodium (mg/l)		120	110											
(*)51. Sodium Adsorption Ratio		2.7	2.6											
(*)52. Sodium (%)		40	41											
53. Solids, Dissolved (mg/l)		696	649											
54. Solids, Suspended														
(*)55. Strontium (ug/l)														
56. Sulfate (mg/l)		160	150											
57. Sulfide (mg/l)														
58. Temperature (°C)		8.0	7.0											
(*)59. Tin (ug/l)														
(*)60. Titanium (ug/l)														
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)														
63. Zinc (ug/l)		20	0											
64. Zirconium (ug/l)														
65. Calcium (mg/l)		70	63											
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC > 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II-A-4

West Fork Stewart Gulch Near Rio Blanco, CO.
U.S.G.S. No. 09306025
April - August, 1974

	4/23	5/3	5/17	5/22	5/31	6/14	6/21	6/26	7/2	7/11	7/20	8/3	8/10	8/31
(*)1. Alkalinity (mg/l)		482	459	437	451	418	381	374	445	370	426	436	495	
(*)2. Aluminum (ug/l)				40										
3. Aromatics, Polycyclic (ug/l)														
4. Arsenic (ug/l)			0	1	2	3	2	1	3	3	0	1	1	
5. Barium (ug/l)				60	100	200	0	<100	<100	<100	0	0	0	
(*)6. Beryllium (ug/l)				<7										
7. Bicarbonate (ug/l)		588	559	533	550	499	438	456	543	459	519	532	603	
(*)8. Bismuth (ug/l)				<15										
9. Boron (ug/l)				90	130	130	130	100	80	120	160	110	120	
10. Cadmium (ug/l)				0	1	1	1	2	0	2	1	1	2	
11. Carbonate (mg/l)		0	0	0	0	5	13	0	0	0	0	0	0	
(*)12. Carbon Dioxide (mg/l)		4.7	8.9	5.4	5.6	3.2	2.4	4.6	6.9	3.7	6.6	6.8	6.1	
13. Chloride (mg/l)		10	8.8	8.6	10	9.1	8.5	7.6	8.2	8.8	10	8.6	12	
14. Chromium (ug/l)				<10										
(*)15. Cobalt (ug/l)				<20										
16. COD (mg/l)														
17. Coliform, Total & Fecal (Cl./100ml														
18. Color (Pt-Co Scale)														
19. Conductivity, Specific (umr)		1740	1620	1640	1630	1570	1530	1540	1630	1580	1610	1640	1730	
20. Copper (ug/l)				<5	4	6	2	3	4	2	3	2	6	
21. Cyanide (mg/l)														
22. Discharge (CFS)			.03	.06		.024		.02	.03	.02	.02	.02	.02	
23. Dissolved Oxygen (mg/l)														
24. Fluoride (mg/l)		.2	.3	.1	1.2	.2	.2	.2	.1	.2	.2	.2	.2	
(*)25. Gallium (ug/l)				<10										
(*)26. Germanium (ug/l)				<20										
(*)27. Hardness (Ca, Mg) (mg/l)		690	660	650	650	610	530	620	700	610	640	650	700	
(*)28. Hardness, Non-Carbonate (mg/l)		200	200	210	200	190	200	250	250	230	220	220	200	
29. Iron (ug/l)		40	30	50	50	20	30	50	40	20	50	190	80	
30. Kjeldahl Nitrogen (mg/l)														
31. Lead (ug/l)				<20	6	10	2	4	0	7	4	6	2	
32. Lithium (ug/l)				10	10	10	20	10	0	0	10	0	0	
33. Magnesium (mg/l)		100	100	100	99	95	94	97	110	100	100	100	110	
34. Manganese (ug/l)		0	20	0	10	0	0	10	0	10	20	0	10	
35. Mercury (ug/l)			.0	.0	.0	.0	.0	.9	.0	.0	.0	.0	.0	
(*)36. Molybdenum (ug/l)				<7										
(*)37. Nickel (ug/l)				<10										
38. Nitrate (mg/l)														
39. Nitrite (mg/l)		.16	.08	.02	.04	.03	.03	.01	.03	.25	.03	.02	.37	
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)		.03	.06	.06	.12	.00	.03	.06	.06	.12	.09	.06	.09	
(*)43. Ortho-Phosphorus (mg/l)		.01	.02	.02	.04	.00	.01	.02	.02	.04	.03	.02	.03	
44. Pesticides (ug/l)														
45. pH		8.3	8.0	8.2	8.2	8.4	8.5	8.2	8.1	8.3	8.1	8.1	8.2	
46. Potassium (mg/l)		7.0	2.8	2.7	2.6	2.7	1.9	2.1	1.2	1.5	2.4	1.5	3.8	
47. Selenium (ug/l)			0	0	0	1	1	1	0	0	1	0	1	
48. Silica (mg/l)		14	10	8.9	12	15	15	15	16	16	17	17	18	
(*)49. Silver (ug/l)				<3										
50. Sodium (mg/l)		160	160	160	150	150	150	150	150	160	170	150	160	
(*)51. Sodium Adsorption Ratio		2.7	2.7	2.7	2.6	2.6	2.7	2.6	2.5	2.8	2.9	2.6	2.6	
(*)52. Sodium (%)		33	34	35	33	35	36	34	32	36	36	33	33	
53. Solids, Dissolved (mg/l)		1230	1180	1150	1130	1050	1060	1060	1120	1130	1160	1170	1240	
54. Solids, Suspended														
(*)55. Strontium (ug/l)				3200										
56. Sulfate (mg/l)		540	520	510	490	470	480	470	470	540	510	530	540	
57. Sulfide (mg/l)														
58. Temperature (°C)		20.0	11.0	21.0	26.0	30.0	30.0	25.0	10.0	27.0	26.0	12.5	8.0	
(*)59. Tin (ug/l)				<15										
(*)60. Titanium (ug/l)				<10										
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)				<10										
63. Zinc (ug/l)				<10	20	20	20	10	30	10	10	[illegible]	30	
64. Zirconium (ug/l)				<30										
65. Calcium (mg/l)		110	100	95	96	88	79	88	98	78	92	96	97	
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC> 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II-A-5
West Fork Stewart Gulch Near Rio Blanco, CO.
U.S.G.S. No. 09306025
September - February, 1975

	9/12	9/20	9/27	10/4	10/23
(*)1. Alkalinity (mg/l)	545		445		444
(*)2. Aluminum (ug/l)					
3. Aromatics, Polycyclic (ug/l)					
4. Arsenic (ug/l)	2		1		1
5. Barium (ug/l)	0		0		0
(*)6. Beryllium (ug/l)					
7. Bicarbonate (ug/l)	664		542		541
(*)8. Bismuth (ug/l)					
9. Boron (ug/l)	150		80		130
10. Cadmium (ug/l)	<1		2		0
11. Carbonate (mg/l)					
(*)12. Carbon Dioxide (mg/l)					
13. Chloride (mg/l)	29		9.7		11
14. Chromium (ug/l)					
(*)15. Cobalt (ug/l)					
16. COD (mg/l)					
17. Coliform, Total & Fecal (Cl./100ml)					
18. Color (Pt-Co Scale)					
19. Conductivity, Specific (umho)	2010		1610		1620
20. Copper (ug/l)	8		1		0
21. Cyanide (mg/l)					
22. Discharge (CFS)	.02		.04		.06
23. Dissolved Oxygen (mg/l)					
24. Fluoride (mg/l)	.1		.2		.2
(*)25. Gallium (ug/l)					
(*)26. Germanium (ug/l)					
(*)27. Hardness (Ca, Mg) (mg/l)	740		660		620
(*)28. Hardness, Non-Carbonate (mg/l)	200		210		180
29. Iron (ug/l)	120		60		20
30. Kjeldahl Nitrogen (mg/l)					
31. Lead (ug/l)	2		2		0
32. Lithium (ug/l)	0		0		0
33. Magnesium (mg/l)	120		100		91
34. Manganese (ug/l)	0		0		10
35. Mercury (ug/l)	.0		.0		.0
(*)36. Molybdenum (ug/l)					
(*)37. Nickel (ug/l)					
38. Nitrate (mg/l)					
39. Nitrite (mg/l)	.01		.08		.01
40. Odor (qualitative)					
41. Oil & Grease (mg/l)					
42. Ortho-Phosphate (mg/l)	.00		.03		.00
(*)43. Ortho-Phosphorus (mg/l)	.00		.01		.00
44. Pesticides (ug/l)					
45. pH					
46. Potassium (mg/l)	9.8		4.2		4.6
47. Selenium (ug/l)	1		0		0
48. Silica (mg/l)	17		17		14
(*)49. Silver (ug/l)					
50. Sodium (mg/l)	220		150		160
(*)51. Sodium Adsorption Ratio	3.5		2.5		2.8
(*)52. Sodium (%)	39		33		36
53. Solids, Dissolved (mg/l)	1400		1130		1120
54. Solids, Suspended					
(*)55. [illegible]					
56. Sulfate (mg/l)	560		480		[illegible]
57. Sulfide (mg/l)					
58. Temperature (°C)	8.0		5.0		7.0
(*)59. Tin (ug/l)					
(*)60. Titanium (ug/l)					
61. Turbidity (JTU)					
(*)62. Vanadium (ug/l)					
63. Zinc (ug/l)	10		10		10
64. Zirconium (ug/l)					
65. Calcium (mg/l)	100		98		100
66. Complete Element Scan					
67. Radioactivity					
Gross Alpha (pcl)					
Radium 226*					
Gross Beta					
Thorium 230**					
Uranium **					
68. Total Organic Carbon (TOC)					
If TOC > 10 mg/liter, then					
Nitrogen (Base Extraction)					
Organic Carbon, Dissolved					
Organic Carbon, Suspended					
Phenols					
Sulfur (Acid Extraction)					

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II-A-6
Stewart Gulch Near Rio Blanco, CO.
U.S.G.S. No. 09306030(a)
September - February, 1975

	9/12	9/20	9/27	10/4	10/23									
(*)1. Alkalinity (mg/l)	427		419		422									
(*)2. Aluminum (ug/l)														
3. Aromatics, Polycyclic (ug/l)														
4. Arsenic (ug/l)	1		1		1									
5. Barium (ug/l)	0		0		0									
(*)6. Beryllium (ug/l)														
7. Bicarbonate (ug/l)	520		511		514									
(*)8. Bismuth (ug/l)														
9. Boron (ug/l)	90		70		110									
10. Cadmium (ug/l)	7		<1		0									
11. Carbonate (mg/l)														
(*)12. Carbon Dioxide (mg/l)														
13. Chloride (mg/l)	8.1		6.4		6.6									
14. Chromium (ug/l)														
(*)15. Cobalt (ug/l)														
16. COD (mg/l)														
17. Coliform, Total & Fecal (Cl.100ml)														
18. Color (Pt-Co Scale)														
19. Conductivity, Specific (uv)	1420		1410		1400									
20. Copper (ug/l)	5		1		0									
21. Cyanide (mg/l)														
22. Discharge (CFS)	2.4		2.3		1.8									
23. Dissolved Oxygen (mg/l)														
24. Fluoride (mg/l)	.2		.3		.3									
(*)25. Gallium (ug/l)														
(*)26. Germanium (ug/l)														
(*)27. Hardness (Ca, Mg) (mg/l)	530		550		530									
(*)28. Hardness, Non-Carbonate (mg/l)	110		130		100									
29. Iron (ug/l)	50		40		20									
30. Kjeldahl Nitrogen (mg/l)														
31. Lead (ug/l)	2		2		1									
32. Lithium (ug/l)	0		0		0									
33. Magnesium (mg/l)	78		76		70									
34. Manganese (ug/l)	0		0		0									
35. Mercury (ug/l)	.0		.0		.0									
(*)36. Molybdenum (ug/l)														
(*)37. Nickel (ug/l)														
38. Nitrate (mg/l)														
39. Nitrite (mg/l)	1.5		1.6		1.5									
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)	.03		.03		.00									
(*)43. Ortho-Phosphorus (mg/l)	.01		.01		.00									
44. Pesticides (ug/l)														
45. pH														
46. Potassium (mg/l)	2.5		2.1		1.9									
47. Selenium (ug/l)	1		1		1									
48. Silica (mg/l)	17		17		17									
(*)49. Silver (ug/l)														
50. Sodium (mg/l)	130		120		120									
(*)51. Sodium Adsorption Ratio	2.5		2.2		2.3									
(*)52. Sodium (%)	35		32		33									
53. Solids, Dissolved (mg/l)	954		936		921									
54. Solids, Suspended														
(*)55. Strontium (ug/l)														
56. Sulfate (mg/l)	370		360		350									
57. Sulfide (mg/l)														
58. Temperature (°C)	8.5		8.0		9.0									
(*)59. Tin (ug/l)														
(*)60. Titanium (ug/l)														
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)														
63. Zinc (ug/l)	10		10		20									
64. Zirconium (ug/l)														
65. Calcium (mg/l)	85		95		95									
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC > 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge
(a) Moved and renumbered U.S.G.S. No. 09306022 in August, 1974.

TABLE II A-7
SCANDARD GULCH NEAR RIO BLANCO, CO.
U.S.G.S No. 09306050
April - August, 1974

	4/23	5/3	5/17	5/22	5/31	6/14	6/21	6/26	7/2	7/11	7/20	8/3		
(*)1. Alkalinity (mg/l)							441							
(*)2. Aluminum (ug/l)														
3. Aromatics, Polycyclic (ug/l														
4. Arsenic (ug/l)							4							
5. Barium (ug/l)							0							
(*)6. Beryllium (ug/l)														
7. Bicarbonate (ug/l)							444							
(*)8. Bismuth (ug/l)														
9. Boron (ug/l)							140							
10. Cadmium (ug/l)							2							
11. Carbonate (mg/l)							6							
(*)12. Carbon Dioxide (mg/l)							3.4							
13. Chloride (mg/l)							10							
14. Chromium (ug/l)														
(*)15. Cobalt (ug/l)														
16. COD (mg/l)														
17. Coliform, Total & Fecal (Cl./100ml)														
18. Color (Pt-Co Scale)														
19. Conductivity, Specific (umr)							1420							
20. Copper (ug/l)							4							
21. Cyanide (mg/l)														
22. Discharge (CFS)							.82^N							
23. Dissolved Oxygen (mg/l)														
24. Fluoride (mg/l)							.3							
(*)25. Gallium (ug/l)														
(*)26. Germanium (ug/l)														
(*)27. Hardness (Ca, Mg) (mg/l)							550							
(*)28. Hardness, Non-Carbonate (mg/l)							110							
29. Iron (ug/l)							[illegible]							
30. Kjeldahl Nitrogen (mg/l)														
31. Lead (ug/l)							6							
32. Lithium (ug/l)							10							
33. Magnesium (mg/l)							79							
34. Manganese (ug/l)							20							
35. Mercury (ug/l)							.0							
(*)36. Molybdenum (ug/l)														
(*)37. Nickel (ug/l)														
38. Nitrate (mg/l)														
39. Nitrite (mg/l)							.10							
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)							.03							
(*)43. Ortho-Phosphorus (mg/l)							.01							
44. Pesticides (ug/l)														
45. pH							8.4							
46. Potassium (mg/l)							2.2							
47. Selenium (ug/l)							2							
48. Silica (mg/l)							13							
(*)49. Silver (ug/l)														
50. Sodium (mg/l)							140							
(*)51. Sodium Adsorption Ratio							2.6							
(*)52. Sodium (%)							35							
53. Solids, Dissolved (mg/l)							951							
54. Solids, Suspended														
(*)55. Strontium (ug/l)														
56. Sulfate (mg/l)							350							
57. Sulfide (mg/l)														
58. Temperature (°C)							21.0							
(*)59. Tin (ug/l)														
(*)60. Titanium (ug/l)														
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)														
63. Zinc (ug/l)							20							
64. Zirconium (ug/l)														
65. Calcium (mg/l)							91							
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC > 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II-A-8
Willow Creek Near Rio Blanco, CO.
U.S.G.S. No. 09306058
April - August, 1974

	4/23	5/3	5/17	5/22	5/31	6/14	6/21	6/26	7/2	7/11	7/20	8/3	8/10	8/31
(*)1. Alkalinity (mg/l)	468	457	425	414	412	426		395	415	422	408	434	429	
(*)2. Aluminum (ug/l)			50											
3. Aromatics, Polycyclic ((ug/l)														
4. Arsenic (ug/l)			1	1	2	1		1	3	2	0	1	1	
5. Barium (ug/l)				55	0	200		<100	<100	<100	0	0	0	
(*)6. Beryllium (ug/l)				<6										
7. Bicarbonate (ug/l)	570	557	518	505	502	519		482	506	515	498	529	523	
(*)8. Bismuth (ug/l)				<13										
9. Boron (ug/l)				120	130	140		120	120	130	60	130	130	
10. Cadmium (ug/l)				0	1	0		6	0	2	1	1	1	
11. Carbonate (mg/l)	0	0	0	0	0	0		0	0	0	0	0	0	
(*)12. Carbon Dioxide (mg/l)	5.8	5.6	10	10	8.0	8.3		7.7	8.1	10	13	11	11	
13. Chloride (mg/l)	14	12	9.9	10	13	10		9.8	11	12	12	11	11	
14. Chromium (ug/l)				<9										
(*)15. Cobalt (ug/l)				<20										
16. COD (mg/l)														
17. Coliform, Total & Fecal(CL./100ml)														
18. Color (Pt-Co Scale)														
19. Conductivity, Specific (µ℧)	1590	1560	1390	1400	1350	1380		1410	1390	1410	1330	1400	1390	
20. Copper (ug/l)				< 4	2	2		17	1	9	8	6	5	
21. Cyanide (mg/l)														
22. Discharge (CFS)	1.0	1.6	1.1	1.0	1.1	.67N		.99	.79	1.3	.94	1.8	1.8	
23. Dissolved Oxygen (mg/l)														
24. Fluoride (mg/l)	.5	.5	.3	.3	1.3	.4		.4	.3	.3	.3	.3	.3	
(*)25. Gallium (ug/l)				<9										
(*)26. Germanium (ug/l)				<20										
(*)27. Hardness (Ca, Mg) (mg/l)	590	610	570	570	560	570		560	540	570	540	560	560	
(*)28. Hardness, Non-Carbonate (mg/l)	120	150	150	150	140	140		160	130	140	130	130	140	
29. Iron (ug/l)	[illegible]	[illegible]	20	20	30	90		40	20	20	60	40	20	
30. Kjeldahl Nitrogen														
31. Lead (ug/l)				< 20	3	8		4	3	5	3	2	[illegible]	
32. Lithium (ug/l)				8	10	10		10	0	0	0	0	0	
33. Magnesium (mg/l)	83	87	80	80	78	80		80	75	80	75	76	77	
34. Manganese (ug/l)	30	20	40	20	10	0		20	0	20	50	20	20	
35. Mercury (ug/l)			.0	.0	.0	.0		.1	.0	.0	.0	.0	.0	
(*)36. Molybdenum (ug/l)				<6										
(*)37. Nickel (ug/l)				<9										
38. Nitrate (mg/l)														
39. Nitrite (mg/l)	.52	2.0	.63	.46	.19	.34		.29	.23	.46	.35	.27	.28	
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)	.12	.09	.09	.09	.12	.06		.03	.00	.12	.03	.03	.00	
(*)43. Ortho-Phosphorus (mg/l)	.04	.03	.03	.03	.04	.02		.01	.00	.04	.01	.01	.00	
44. Pesticides (ug/l)														
45. pH	8.2	8.2	7.9	7.9	8.0	8.0		8.0	8.0	7.9	7.8	7.9	7.9	
46. Potassium (mg/l)	5.0	4.2	2.0	1.8	1.7	2.3		3.8	1.7	2.2	2.2	2.0	2.2	
47. Selenium (ug/l)			1	1	1	1		1	1	2	1	2	0	
48. Silica (mg/l)	16	17	17	16	16	17		16	15	17	16	15	18	
(*)49. Silver (ug/l)				< 2										
50. Sodium (mg/l)	150	140	130	130	130	130		140	130	130	130	130	180	
(*)51. Sodium Adsorption Ratio	2.7	2.5	2.4	2.4	2.4	2.4		2.6	2.4	2.4	2.4	2.4	3.3	
(*)52. Sodium (%)	35	33	33	33	34	33		35	34	33	34	33	41	
53. Solids, Dissolved (mg/l)	1100	1080	976	964	953	933		941	938	973	934	956	1150	
54. Solids, Suspended														
(*)55. Strontium (ug/l)				[illegible]										
56. Sulfate (mg/l)	450	440	360	360	370	340		360	360	380	[illegible]	[illegible]	[illegible]	
57. Sulfide (mg/l)														
58. Temperature (°C)	12.0	17.0	10.0	17.0	18.0	18.0		18.5	14.0	16.5	17.5	10.5	13.0	
(*)59. Tin (ug/l)				<13										
(*)60. Titanium (ug/l)				<9										
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)				< 9.0										
63. Zinc (ug/l)				8	30	30		20	30	10	30	40	20	
64. Zirconium (ug/l)				<30										
65. Calcium (mg/l)	100	100	98	95	94	96		92	94	95	91	99	99	
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC> 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)

** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II-A-9
Willow Creek Near Rio Blanco, CO.
U.S.G.S. No. 09306058
September - February, 1975

	9/12	9/20	9/27	10/4	10/23									
(*)1. Alkalinity (mg/l)				409										
(*)2. Aluminum (ug/l)														
3. Aromatics, Polycyclic (ug/l)														
4. Arsenic (ug/l)				1										
5. Barium (ug/l)				0										
(*)6. Beryllium (ug/l)														
7. Bicarbonate (ug/l)				499										
(*)8. Bismuth (ug/l)														
9. Boron (ug/l)				70										
10. Cadmium (ug/l)				0										
11. Carbonate (mg/l)				64										
(*)12. Carbon Dioxide (mg/l)														
13. Chloride (mg/l)				10										
14. Chromium (ug/l)														
(*)15. Cobalt (ug/l)														
16. COD (mg/l)														
17. Coliform, Total & Fecal (Cl./100ml)														
18. Color (Pt-Co Scale)														
19. Conductivity, Specific (uʊ)				1370										
20. Copper (ug/l)				2										
21. Cyanide (mg/l)														
22. Discharge (CFS)														
23. Dissolved Oxygen														
24. Fluoride (mg/l)				.4										
(*)25. Gallium (ug/l)														
(*)26. Germanium (ug/l)														
(*)27. Hardness (Ca, Mg) (mg/l)				460										
(*)28. Hardness, Non-Carbonate (mg/l)				51										
29. Iron (ug/l)				20										
30. Kjeldahl Nitrogen (mg/l)														
31. Lead (ug/l)				1										
32. Lithium (ug/l)				0										
33. Magnesium (mg/l)				73										
34. Manganese (ug/l)				0										
35. Mercury (ug/l)														
(*)36. Molybdenum (ug/l)														
(*)37. Nickel (ug/l)														
38. Nitrate (mg/l)														
39. Nitrite (mg/l)				.42										
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)				.09										
(*)43. Ortho-Phosphorus (mg/l)				.03										
44. Pesticides (ug/l)														
45. pH														
46. Potassium (mg/l)				2.3										
47. Selenium (ug/l)				1										
48. Silica (mg/l)				17										
(*)49. Silver (ug/l)														
50. Sodium (mg/l)				130										
(*)51. Sodium Adsorption Ratio				2.6										
(*)52. Sodium (%)				38										
53. Solids, Dissolved (mg/l)				875										
54. Solids, Suspended														
(*)55. Strontium (ug/l)														
56. Sulfate (mg/l)				330										
57. Sulfide (mg/l)														
58. Temperature (°C)				11.5										
(*)59. Tin (ug/l)														
(*)60. Titanium (ug/l)														
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)														
63. Zinc (ug/l)				10										
64. Zirconium (ug/l)														
65. Calcium (mg/l)														
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC > 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II-A-10
Piceance Creek Above Hunter Creek, Near Rio Blanco, CO.
U.S.G.S. No. 09306061
April - August, 1974

	4/23	5/3	5/17	5/22	5/31	6/14	6/21	6/26	7/2	7/11	7/20	8/3	8/10	8/31
(*)1. Alkalinity (mg/l)	430	419	518	553	550	522	527	549	566	508	403		493	458
(*)2. Aluminum (ug/l)				50										
3. Aromatics, Polycyclic (ug/l)														
4. Arsenic (ug/l)			1	2	3	3	3	3	6	4	3		3	2
5. Barium (ug/l)				70	0	100	0	<100	<100	<100	0		0	100
(*)6. Beryllium (ug/l)				<7										
7. Bicarbonate (ug/l)	524	511	631	674	671	636	643	669	690	619	491		601	558
(*)8. Bismuth (ug/l)				<14										
9. Boron (ug/l)				190	240	240	240	240	250	270	320		230	230
10. Cadmium (ug/l)				0	1	1	0	1	0	2	1		<1	<1
11. Carbonate (mg/l)	0	0	0	0	0	0	0	0	0	0	0		0	
(*)12. Carbon Dioxide (mg/l)	5.3	5.2	8.0	6.8	6.8	6.4	6.5	11	7.0	12	20		7.6	
13. Chloride (mg/l)	13	11	14	15	15	16	15	16	15	16	13		15	15
14. Chromium (ug/l)				<10										
(*)15. Cobalt (ug/l)				<20										
16. COD (mg/l)														
17. Coliform, Total & Fecal (Cl./100ml)														
18. Color (Pt-Co Scale)														
19. Conductivity, Specific (umr)	1190	1140	1510	1590	1560	1540	1540	1660	1630	1580	1140		1340	1320
20. Copper (ug/l)				<5	2	9	2	3	1	5	20		3	6
21. Cyanide (mg/l)														
22. Discharge (CFS)	29	30	6.3	6.2	6.0	4.6	5.5	4.6	6.0	4.6	31		19	17
23. Dissolved Oxygen (mg/l)														
24. Fluoride (mg/l)	1.0	.9	.7	.6	1.5	.7	.6	.7	.6	.7	.5		.7	.7
(*)25. Gallium (ug/l)				<10										
(*)26. Germanium (ug/l)				<20										
(*)27. Hardness (Ca, Mg) (mg/l)	410	400	510	540	540	520	520	540	570	530	370		450	450
(*)28. Hardness, Non-Carbonate (mg/l)	0	0	0	0	0	0	0	0	6	22	0		0	0
29. Iron (ug/l)	110	20	20	50	20	20	[illegible]	50	30	20	130		70	[illegible]
30. Kjeidahl Nitrogen (mg/l)														
31. Lead (ug/l)				<20	7	8	5	4	2	3	4		2	8
32. Lithium (ug/l)				6	10	10	10	0	0	0	0		0	0
33. Magnesium (mg/l)	55	54	76	82	81	80	79	84	88	82	47		62	64
34. Manganese (ug/l)	30	10	60	70	100	100	110	190	150	150	70		80	10
35. Mercury (ug/l)			.0	.0	.0	.0	.0	.0	.0	.0	.0		.5	.0
(*)36. Molybdenum (ug/l)				7										
(*)37. Nickel (ug/l)				<10										
38. Nitrate (mg/l)														
39. Nitrite (mg/l)	.60	.64	.62	.35	.15	.08	.08	.13	.19	.22	.68		.78	.33
40. Odor (qualitative)														
41. Oil & Grease (mg/l)														
42. Ortho-Phosphate (mg/l)	.12	.03	.12	.15	.09	.06	.03	.09	.00	.21	.09		.18	.09
(*)43. Ortho-Phosphorus (mg/l)	.04	.01	.04	.04	.03	.02	.01	.03	.00	.07	.03		.06	.03
44. Pesticides (ug/l)				-										
45. pH	8.2	8.2	8.1	8.2	8.2	8.2	8.2	8.0	8.2	7.9	7.6		8.1	
46. Potassium (mg/l)	3.3	3.7	3.8	3.9	4.2	4.2	4.0	6.4	3.8	4.1	5.5		4.3	4.2
47. Selenium (ug/l)			0	1	1	2	1	1	2	1	0		1	1
48. Silica (mg/l)	16	17	19	18	17	16	16	15	17	14	12		20	18
(*)49. Silver (ug/l)				<3										
50. Sodium (mg/l)	120	120	170	180	180	180	180	200	180	200	120		150	150
(*)51. Sodium Adsorption Ratio	2.6	2.6	3.3	3.4	3.4	3.4	3.4	3.8	3.3	3.8	2.7		3.1	3.1
(*)52. Sodium (%)	38	39	42	42	42	43	43	44	40	45	41		42	42
53. Solids, Dissolved (mg/l)	765	754	1030	1070	1060	1020	1030	1090	1080	1080	736		901	885
54. Solids, Suspended														
(*)55. Strontium (ug/l)				[illegible]										
56. Sulfate (mg/l)	220	220	350	350	350	330	340	360	350	380	220		270	280
57. Sulfide (mg/l)														
58. Temperature (°C)	14.0	7.5	11.0	16.0	18.0	21.5	23.0	20.0	16.0	21.0	14.5		18.0	18.0
(*)59. Tin (ug/l)				<15										
(*)60. Titanium (ug/l)				<10										
61. Turbidity (JTU)														
(*)62. Vanadium (ug/l)				<10										
63. Zinc (ug/l)				<10	20	20	20	30	20	10	50		20	10
64. Zirconium (ug/l)				<30										
65. Calcium (mg/l)	75	73	79	83	84	77	78	77	84	77	72		79	75
66. Complete Element Scan														
67. Radioactivity														
Gross Alpha (pcl)														
Radium 226*														
Gross Beta														
Thorium 230**														
Uranium **														
68. Total Organic Carbon (TOC)														
If TOC > 10 mg/liter, then														
Nitrogen (Base Extraction)														
Organic Carbon, Dissolved														
Organic Carbon, Suspended														
Phenols														
Sulfur (Acid Extraction)														

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

TABLE II-A-11

Piceance Creek Above Hunter Creek, Near Rio Blanco, CO.
U.S.G.S. No. 09306061
September - February, 1975

	9/12	9/20	9/27	10/4	10/23
(*)1. Alkalinity (mg/l)			551		542
(*)2. Aluminum (ug/l)					
3. Aromatics, Polycyclic (ug/l)					
4. Arsenic (ug/l)			0		2
5. Barium (ug/l)			0		0
(*)6. Beryllium (ug/l)					
7. Bicarbonate (ug/l)			551		661
(*)8. Bismuth (ug/l)					
9. Boron (ug/l)			180		170
10. Cadmium (ug/l)			<1		0
11. Carbonate (mg/l)					
(*)12. Carbon Dioxide (mg/l)					
13. Chloride (mg/l)			12		14
14. Chromium (ug/l)					
(*)15. Cobalt (ug/l)					
16. COD (mg/l)					
17. Coliform, Total & Fecal (Cl./100ml)					
18. Color (Pt-Co Scale)					
19. Conductivity, Specific (umho)			1330		1550
20. Copper (ug/l)			6		2
21. Cyanide (mg/l)					
22. Discharge (CFS)			10		6.2
23. Dissolved Oxygen (mg/l)					
24. Fluoride (mg/l)			.8		.6
(*)25. Gallium (ug/l)					
(*)26. Germanium (ug/l)					
(*)27. Hardness (Ca, Mg) (mg/l)			470		530
(*)28. Hardness, Non-Carbonate (mg/l)			16		0
29. Iron (ug/l)			40		30
30. Kjeldahl Nitrogen					
31. Lead (ug/l)			2		2
32. Lithium (ug/l)			0		0
33. Magnesium (mg/l)			67		78
34. Manganese (ug/l)			20		170
35. Mercury (ug/l)			.0		.0
(*)36. Molybdenum (ug/l)					
(*)37. Nickel (ug/l)					
38. Nitrate (mg/l)					
39. Nitrite (mg/l)			.35		.27
40. Odor (qualitative)					
41. Oil & Grease (mg/l)					
42. Ortho-Phosphate (mg/l)			.09		.12
(*)43. Ortho-Phosphorus (mg/l)			.03		.04
44. Pesticides (ug/l)					
45. pH					
46. Potassium (mg/l)			3.6		4.3
47. Selenium (ug/l)			1		1
48. Silica (mg/l)			18		19
(*)49. Silver (ug/l)					
50. Sodium (mg/l)			140		170
(*)51. Sodium Adsorption Ratio			2.8		3.2
(*)52. Sodium (%)			39		41
53. Solids, Dissolved (mg/l)			872		1030
54. Solids, Suspended					
(*)55. Strontium (ug/l)					
56. Sulfate (mg/l)			[illegible]		330
57. Sulfide (mg/l)					
58. Temperature (°C)			15.5		10.0
(*)59. Tin (ug/l)					
(*)60. Titanium (ug/l)					
61. Turbidity (JTU)					
(*)62. Vanadium (ug/l)					
63. Zinc (ug/l)			10		20
64. Zirconium (ug/l)					
65. Calcium (mg/l)			77		83
66. Complete Element Scan					
67. Radioactivity					
Gross Alpha (pcl)					
Radium 226*					
Gross Beta					
Thorium 230**					
Uranium **					
68. Total Organic Carbon (TOC)					
If TOC> 10 mg/liter, then					
Nitrogen (Base Extraction)					
Organic Carbon, Dissolved					
Organic Carbon, Suspended					
Phenols					
Sulfur (Acid Extraction)					

(*) Not Required

* Required if Gross Alpha > 4 picocuries per liter (pcl)
** Required if Gross Beta > 100 picocuries per liter (pcl)

N Non-Instantaneous Discharge

09306007 - PICEANCE CRE BELOW RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OC 1973 TO SEPTEMBER 1974

DATE	TIME	TYPE	SAMPLE NUMBER (00008)	TEMPER-ATURE (DEG C) (00010)	DIS-CHARGE (CFS) (00060)	INSTAN-TANEOUS DIS-CHARGE (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	CARBON DIOXIDE (CO2) (MG/L) (00405)	ALKA-LINITY AS CACO3 (MG/L) (00410)	BICAR-BONATE (HCO3) (MG/L) (00440)	CAR-BONATE (CO3) (MG/L) (00445)
APR.												
23...	1230	2	--	10.0	--	25	977	8.2	4.6	374	456	0
MAY												
03...	1100	2	--	7.5	--	34	912	8.2	4.4	358	436	0
17...	1130	2	--	9.0	12	--	1080	8.2	5.2	423	516	0
22...	1100	2	1881	11.0	--	6.6	1240	8.1	7.6	491	599	0
31...	1230	2	--	15.0	--	6.4	1220	8.3	4.8	492	600	0
JUNE												
14...	1210	2	--	19.0	6.9	--	1190	8.2	5.9	476	580	0
21...	--	2	--	19.0	--	7.0	1200	8.2	5.8	472	576	0
26...	1030	2	--	16.0	7.3	--	1270	8.3	4.7	481	587	0
JULY												
02...	0900	2	--	10.5	--	6.4	1250	8.2	6.2	506	617	0
11...	1530	2	--	22.0	--	4.0	1250	8.1	7.5	481	587	0
20...	1445	2	--	20.0	--	14	1030	7.8	11	362	441	0
AUG.												
03...	0915	2	--	13.0	8.0	--	1210	8.1	7.6	488	595	0
10...	1245	2	--	14.0	28	--	1020	8.2	5.0	408	497	0
31...	1630	2	--	19.5	--	8.4	--	6.9	--	--	--	--
SEP.												
20...	1000	2	--	8.0	--	7.1	1080	--	--	428	522	--
27...	1100	2	--	7.0	--	8.1	1060	--	--	412	502	--

PROCESS [illegible] 12/03/74
DISTRICT CODE 08

09306007 - PICEANCE [illegible] BELOW RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L) (00660)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L) (00671)	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)
APR.												
23...	.63	.06	.02	340	0	69	40	96	2.3	38	2.7	13
MAY												
03...	.70	.03	.01	320	0	66	38	88	2.1	37	3.1	9.7
17...	.56	.09	.03	380	0	74	47	110	2.5	38	3.4	12
22...	.28	.12	.04	410	0	77	52	140	3.0	43	2.9	15
31...	.15	.18	.06	410	0	76	53	140	3.0	42	4.3	17
JUNE												
14...	.08	.06	.02	400	0	73	52	150	3.3	45	3.7	15
21...	.03	.03	.01	390	0	76	49	140	3.1	44	3.4	17
26...	.04	.06	.02	400	0	76	50	150	3.3	45	4.1	16
JULY												
02...	.01	.00	.00	420	0	74	56	150	3.2	44	3.5	16
11...	2.5	1.1	.36	410	0	72	57	160	3.4	45	3.8	17
20...	.47	.12	.04	340	0	73	39	110	2.6	41	5.7	16
AUG.												
03...	.15	.06	.02	390	0	75	48	140	3.1	44	3.9	16
10...	.69	.12	.04	350	0	69	42	110	2.6	41	3.4	13
31...	.12	.03	.01	320	--	51	47	130	3.2	46	4.3	15
SEP.												
20...	.23	.06	.02	380	0	70	50	120	2.7	40	4.2	16
27...	.21	.03	.01	340	0	63	44	110	2.6	41	3.2	13

09306007 - PICEANCE C BELOW RIO BLANCO, CO.
E

PROCESS, 12/03/74
DISTRICT CODE 0

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BERYL-LIUM (BE) (UG/L) (01010)	DIS-SOLVED BISMUTH (BI) (UG/L) (01015)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	DIS-SOLVED COPPER (CU) (UG/L) (01040)
APR.												
23...	160	1.3	15	--	--	--	--	--	--	--	--	--
MAY												
03...	140	.7	14	--	--	--	--	--	--	--	--	--
17...	180	.8	17	2	--	--	--	--	--	--	--	--
22...	190	.9	17	1	130	<6	<11	200	0	<8	<15	<4
31...	180	.9	17	2	200	--	--	240	1	--	--	4
JUNE												
14...	180	1.0	15	1	200	--	--	250	0	--	--	2
21...	180	.9	13	3	0	--	--	260	1	--	--	3
26...	180	.9	16	2	<100	--	--	250	2	--	--	9
JULY												
02...	190	.8	14	5	<100	--	--	250	0	--	--	5
11...	200	.2	17	4	<100	--	--	280	1	--	--	1
20...	190	.7	15	3	0	--	--	260	1	--	--	12
AUG.												
03...	190	.9	18	2	0	--	--	240	1	--	--	2
10...	170	.8	17	3	0	--	--	200	<1	--	--	4
31...	150	.9	16	3	100	--	--	240	1	--	--	3
SEP.												
20...	160	1.0	16	2	100	--	--	120	1	--	--	1
27...	150	1.1	16	2	0	--	--	160	<1	--	--	0

PROCESS DA /03/74

09306007 - PICEANCE CRRE OW RIO BLANCO, CO.

DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED MOLYB-DENUM (MO) (UG/L) (01060)	DIS-SOLVED NICKEL (NI) (UG/L) (01065)	DIS-SOLVED SILVER (AG) (UG/L) (01075)	DIS-SOLVED STRON-TIUM (SR) (UG/L) (01080)	DIS-SOLVED VANA-DIUM (V) (UG/L) (01085)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED TIN (SN) (UG/L) (01100)	DIS-SOLVED ALUM-INUM (AL) (UG/L) (01106)
APR.											
23...	110	--	30	--	--	--	--	--	--	--	--
MAY											
03...	40	--	10	--	--	--	--	--	--	--	--
17...	40	--	100	--	--	--	--	--	--	--	--
22...	300	<16	210	6	<8	<2	1600	<8.0	10	<11	60
31...	30	5	140	--	--	--	--	--	30	--	--
JUNE											
14...	40	7	40	--	--	--	--	--	30	--	--
21...	20	8	180	--	--	--	--	--	40	--	--
26...	40	7	200	--	--	--	--	--	30	--	--
JULY											
02...	50	1	230	--	--	--	--	--	0	--	--
11...	50	4	180	--	--	--	--	--	10	--	--
20...	150	3	140	--	--	--	--	--	40	--	--
AUG.											
03...	90	4	180	--	--	--	--	--	20	--	--
10...	50	2	70	--	--	--	--	--	30	--	--
31...	70	6	50	--	--	--	--	--	20	--	--
SEP.											
20...	30	4	50	--	--	--	--	--	20	--	--
27...	120	2	50	--	--	--	--	--	0	--	--

PROCESS DA /03/74
DISTRICT CODE 08

09306007 - PICEANCE CRE LOW RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED GALLIUM (GA) (UG/L) (01120)	DIS-SOLVED GER-MANIUM (GE) (UG/L) (01125)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED TI-TANIUM (TI) (UG/L) (01150)	DIS-SOLVED ZIR-CONIUM (ZR) (UG/L) (01160)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
APR.											
23...	--	--	--	--	--	--	625	43.5	.85	--	6366
MAY											
03...	--	--	--	--	--	--	578	53.7	.79	--	6366
17...	--	--	--	0	--	--	701	22.7	.95	.0	6366
22...	<8	<16	10	2	<8	<24	792	14.2	1.08	.0	6366
31...	--	--	10	1	--	--	786	13.6	1.07	.0	6366
JUNE											
14...	--	--	10	1	--	--	776	14.5	1.06	.0	6366
21...	--	--	10	1	--	--	764	14.4	1.04	.0	6366
26...	--	--	10	0	--	--	783	15.4	1.06	.0	6366
JULY											
02...	--	--	0	1	--	--	809	14.1	1.10	.0	6366
11...	--	--	0	1	--	--	829	9.04	1.13	.0	6366
20...	--	--	0	0	--	--	670	26.4	.91	.0	6366
AUG.											
03...	--	--	0	1	--	--	786	17.0	1.07	.0	6366
10...	--	--	0	2	--	--	674	51.0	.92	.0	6366
31...	--	--	0	1	--	--	--	--	--	.8	6366
SEP.											
20...	--	--	0	1	--	--	696	13.4	.95	.0	6366
27...	--	--	0	1	--	--	649	14.3	.88	.1	6366

.WA[illegible] PROCESS D[illegible]2/03/74

09306025 - WEST FORK STEW[illegible]T GULCH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	TYPE	SAMPLE NUMBER (00008)	TEMPER-ATURE (DEG C) (00010)	DIS-CHARGE (CFS) (00060)	INSTAN-TANEOUS DIS-CHARGE (CFS) (00061)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS) (00095)	PH (UNITS) (00400)	CARBON DIOXIDE (CO2) (MG/L) (00405)	ALKA-LINITY AS CACO3 (MG/L) (00410)	BICAR-BONATE (HCO3) (MG/L) (00440)	CAR-BONATE (CO3) (MG/L) (00445)
MAY												
03...	1300	2	--	20.0	--	--	1740	8.3	4.7	482	588	0
17...	1000	2	--	11.0	--	.03	1620	8.0	8.9	459	559	0
22...	1240	2	1882	21.0	--	.06	1640	8.2	5.4	437	533	0
31...	1345	2	--	26.0	--	--	1630	8.2	5.6	451	550	0
JUNE												
14...	1230	2	--	30.0	.02	--	1570	8.4	3.2	418	499	5
21...	1330	2	--	30.0	--	--	1530	8.5	2.4	381	438	13
26...	1140	2	--	25.0	--	.02	1540	8.2	4.6	374	456	0
JULY												
02...	0700	2	--	10.0	--	.03	1630	8.1	6.9	445	543	0
11...	1415	2	--	27.0	--	.02	1580	8.3	3.7	376	459	0
20...	1415	2	--	26.0	--	.02	1610	8.1	6.6	426	519	0
AUG.												
03...	0840	2	--	12.5	--	.02	1640	8.1	6.8	436	532	0
10...	1005	2	--	8.0	--	.02	1730	8.2	6.1	495	603	0
SEP.												
12...	1200	2	--	8.0	--	.02	2010	--	--	545	664	--
27...	0945	2	--	5.0	--	.04	1610	--	--	445	542	--

09306025 - WEST FORK STEWA[illegible]CH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L) (00660)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L) (00671)	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)
MAY												
03...	.16	.03	.01	690	200	110	100	160	2.7	33	7.0	10
17...	.08	.06	.02	660	200	100	100	160	2.7	34	2.8	8.8
22...	.02	.06	.02	650	210	95	100	160	2.7	35	2.7	8.6
31...	.04	.12	.04	650	200	96	99	150	2.6	33	2.6	10
JUNE												
14...	.03	.00	.00	610	190	88	95	150	2.6	35	2.7	9.1
21...	.03	.03	.01	580	200	79	94	150	2.7	36	1.9	8.5
26...	.01	.06	.02	620	250	88	97	150	2.6	34	2.1	7.6
JULY												
02...	.03	.06	.02	700	250	98	110	150	2.5	32	1.2	8.2
11...	.25	.12	.04	610	230	78	100	160	2.8	36	1.5	8.8
20...	.03	.09	.03	640	220	92	100	170	2.9	36	2.4	10
AUG.												
03...	.02	.06	.02	650	220	96	100	150	2.6	33	1.5	8.6
10...	.37	.09	.03	700	200	97	110	160	2.6	33	3.8	12
SEP.												
12...	.01	.00	.00	740	200	100	120	220	3.5	39	9.8	29
27...	.08	.03	.01	660	210	98	100	150	2.5	33	4.2	9.7

09306025 - WEST FORK ST[illegible] GULCH NEAR RIO BLANCO, CO.   DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BERYL-LIUM (BE) (UG/L) (01010)	DIS-SOLVED BISMUTH (BI) (UG/L) (01015)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	DIS-SOLVED COPPER (CU) (UG/L) (01040)
MAY												
03...	540	.2	14	--	--	--	--	--	--	--	--	--
17...	520	.3	10	0	--	--	--	--	--	--	--	--
22...	510	.1	8.9	1	60	<7	<15	90	0	<10	<20	<5
31...	490	1.2	12	2	100	--	--	130	1	--	--	4
JUNE												
14...	470	.2	15	3	200	--	--	130	1	--	--	6
21...	480	.0	15	2	0	--	--	130	1	--	--	2
26...	470	.2	15	1	<100	--	--	100	2	--	--	3
JULY												
02...	470	.1	16	3	<100	--	--	90	0	--	--	4
11...	540	.2	16	3	<100	--	--	120	2	--	--	2
20...	510	.2	17	0	0	--	--	160	1	--	--	8
AUG.												
03...	530	.2	17	1	0	--	--	110	1	--	--	2
10...	540	.2	18	1	0	--	--	120	2	--	--	6
SEP.												
12...	580	.1	17	2	0	--	--	150	<1	--	--	8
27...	480	.2	17	1	0	--	--	80	2	--	--	1

PROCESS DATE [illegible]/03/74

09306025 - WEST FORK ST[illegible] GULCH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DISSOLVED IRON (FE) (UG/L) (01046)	DISSOLVED LEAD (PB) (UG/L) (01049)	DISSOLVED MANGANESE (MN) (UG/L) (01056)	DISSOLVED MOLYBDENUM (MO) (UG/L) (01060)	DISSOLVED NICKEL (NI) (UG/L) (01065)	DISSOLVED SILVER (AG) (UG/L) (01075)	DISSOLVED STRONTIUM (SR) (UG/L) (01080)	DISSOLVED VANADIUM (V) (UG/L) (01085)	DISSOLVED ZINC (ZN) (UG/L) (01090)	DISSOLVED TIN (SN) (UG/L) (01100)	DISSOLVED ALUMINUM (AL) (UG/L) (01106)
MAY											
03...	40	--	0	--	--	--	--	--	--	--	--
17...	30	--	20	--	--	--	--	--	--	--	--
22...	50	<20	0	<7	<10	<3	3200	<10	<10	<15	40
31...	50	6	10	--	--	--	--	--	20	--	--
JUNE											
14...	20	10	0	--	--	--	--	--	20	--	--
21...	30	2	0	--	--	--	--	--	20	--	--
26...	50	4	10	--	--	--	--	--	10	--	--
JULY											
02...	40	0	0	--	--	--	--	--	30	--	--
11...	20	7	10	--	--	--	--	--	10	--	--
20...	50	4	20	--	--	--	--	--	10	--	--
AUG.											
03...	190	6	0	--	--	--	--	--	20	--	--
10...	80	2	10	--	--	--	--	--	30	--	--
SEP.											
12...	120	2	0	--	--	--	--	--	10	--	--
27...	60	2	0	--	--	--	--	--	10	--	--

PROCESS DA[illegible]/03/74

09306025 - WEST FORK ST[illegible] GULCH NEAR RIO BLANCO, CO.   DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED GALLIUM (GA) (UG/L) (01120)	DIS-SOLVED GER-MANIUM (GE) (UG/L) (01125)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED TI-TANIUM (TI) (UG/L) (01150)	DIS-SOLVED ZIR-CONIUM (ZR) (UG/L) (01160)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
MAY											
03...	--	--	--	--	--	--	1230	--	1.67	--	6668
17...	--	--	--	0	--	--	1180	.10	1.60	.0	6668
22...	<10	<20	10	0	<10	<30	1150	.19	1.56	.0	6668
31...	--	--	10	0	--	--	1130	--	1.54	.0	6668
JUNE											
14...	--	--	10	1	--	--	1080	.06	1.47	.0	6668
21...	--	--	20	1	--	--	1060	--	1.44	.0	6668
26...	--	--	10	1	--	--	1060	.06	1.44	.9	6668
JULY											
02...	--	--	0	0	--	--	1120	.09	1.52	.0	6668
11...	--	--	0	0	--	--	1130	.06	1.54	.0	6668
20...	--	--	10	1	--	--	1160	.06	1.58	.0	6668
AUG.											
03...	--	--	0	0	--	--	1170	.06	1.59	.0	6668
10...	--	--	0	1	--	--	1240	.07	1.69	.0	6668
SEP.											
12...	--	--	0	1	--	--	1400	.08	1.90	.0	6668
27...	--	--	0	0	--	--	1130	.12	1.54	.0	6668

PROCESS DAT /03/74

09306025 - WEST FORK S1 GULCH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	TIME	TYPE	TEMPER- ATURE (DEG C) (00010)	INSTAN- TANEOUS DIS- CHARGE (CFS) (00061)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS) (00095)	ALKA- LINITY AS CACO3 (MG/L) (00410)	BICAR- BONATE (HCO3) (MG/L) (00440)	DIS- SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS- SOLVED ORTHO PHOS- PHATE (PO4) (MG/L) (00660)	DIS- SOLVED ORTHO. PHOS- PHORUS (P) (MG/L) (00671)
OCT.										
23...	1030	2	7.0	.06	1620	444	541	.01	.00	.00

PROCESS DATE 12/03/74

09306025 - WEST FORK S[illegible]T GULCH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCT[illegible]R 1974 TO SEPTEMBER 1975

DATE	HARD- NESS (CA,MG) (MG/L) (00900)	NON- CAR- BONATE HARD- NESS (MG/L) (00902)	DIS- SOLVED CAL- CIUM (CA) (MG/L) (00915)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L) (00925)	DIS- SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD- SORP- TION RATIO (00931)	PERCENT SODIUM (00932)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L) (00935)	DIS- SOLVED CHLO- RIDE (CL) (MG/L) (00940)	DIS- SOLVED SULFATE (SO4) (MG/L) (00945)
OCT.										
23...	620	180	100	91	160	2.8	36	4.6	11	470

PROCESS D [illegible] 12/03/74

09306025 - WEST FORK TE [illegible] T GULCH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)
OCT.									
23...	.2	14	1	0	130	0	0	20	0

PROCESS DAT 03/74

09306025 - WEST FORK STE GULCH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	DIS- SOLVED MAN- GANESE (MN) (UG/L) (01056)	DIS- SOLVED ZINC (ZN) (UG/L) (01090)	DIS- SOLVED LITHIUM (LI) (UG/L) (01130)	DIS- SOLVED SELE- NIUM (SE) (UG/L) (01145)	DIS- SOLVED SOLIDS (SUM OF CONSTI- TUENTS) (MG/L) (70301)	DIS- SOLVED SOLIDS (TONS PER DAY) (70302)	DIS- SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS- SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
OCT. 23...	10	10	0	0	1120	.18	1.52	.0	6668

PROCESS D[illegible]/03/74

09306030 - STEWART GULCH NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	TYPE	TEMPERATURE (DEG C) (00010)	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	ALKALINITY AS CACO3 (MG/L) (00410)	BICARBONATE (HCO3) (MG/L) (00440)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L) (00660)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L) (00671)
SEP.										
12...	1300	2	8.5	2.4	1420	427	520	1.5	.03	.01
27...	1015	2	8.0	2.3	1410	419	511	1.6	.03	.01

09306030 - STEWART GULC R RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)
SEP.										
12...	530	110	85	78	130	2.5	35	2.5	8.1	370
27...	550	130	95	76	120	2.2	32	2.1	6.4	360

PROCESS DA /03/74
DISTRICT CODE 08

09306030 - STEWART GULC R RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)
SEP.									
12...	.2	17	1	0	90	7	5	50	2
27...	.3	17	1	0	70	<1	1	40	2

09306030 - STEWART G AR RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
SEP.									
12...	0	10	0	1	954	6.36	1.30	.0	6392
27...	0	10	0	1	936	5.99	1.27	.0	6392

09306030 - STEWART GU[illegible]AR RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	TIME	TYPE	TEMPERATURE (DEG C) (00010)	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	ALKALINITY AS CACO3 (MG/L) (00410)	BICARBONATE (HCO3) (MG/L) (00440)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L) (00660)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L) (00671)
OCT. 23...	1130	2	9.0	1.8	1400	422	514	1.5	.00	.00

PROCESS D[illegible]2/03/74
DISTRICT CODE 08

09306030 - STEWART GULC[illegible]AR RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)
OCT.										
23...	530	100	95	70	120	2.3	33	1.9	6.6	350

09306030 - STEWART GUL EAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR O R 1974 TO SEPTEMBER 1975

DATE	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)
OCT.									
23...	.3	17	1	0	110	0	0	20	1

09306030 - STEWART GUL[illegible]AR RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
OCT.									
23...	0	20	0	1	921	4.55	1.25	.0	6392

PROCESS DA[illegible] 12/03/74

09306050 - SCANDARD GU[illegible]AR RIO BLANCO, CO.

DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	TYPE	TEMPERATURE (DEG C) (00010)	DISCHARGE (CFS) (00060)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	CARBON DIOXIDE (CO2) (MG/L) (00405)	ALKALINITY AS CACO3 (MG/L) (00410)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)
JUNE											
21...	1500	2	21.0	.82	1420	8.4	3.4	441	444	46	.10

09306050 - SCANDARD GU[illegible]AR RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L) (00660)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L) (00671)	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)
JUNE 21...	.03	.01	550	110	91	79	140	2.6	35	2.2

PROCESS[illegible] 12/03/74
DISTRICT CODE 0[illegible]

09306050 - SCANDARD G[illegible] NEAR RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	DIS-SOLVED IRON (FE) (UG/L) (01046)
JUNE										
21...	10	350	.3	13	4	0	140	2	4	20

PROCESS [illegible] 2/03/74
DISTRICT CODE 08

09306050 - SCANDARD GU[illegible]EAR RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
JUNE 21...	6	20	20	10	2	951	2.11	1.29	.0	6646

PROCESS DAT [illegible]/03/74
DISTRICT CODE 08

09306058 - WILLOW CREEK N[illegible] RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	TYPE	SAMPLE NUMBER (00008)	TEMPERATURE (DEG C) (00010)	DISCHARGE (CFS) (00060)	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	CARBON DIOXIDE (CO2) (MG/L) (00405)	ALKALINITY AS CACO3 (MG/L) (00410)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)
APR.												
23...	1715	2	--	12.0	--	1.0	1590	8.2	5.8	468	570	0
MAY												
03...	1545	2	--	17.0	--	1.6	1560	8.2	5.6	457	557	0
17...	1245	2	--	10.0	--	1.1	1390	7.9	10	425	518	0
22...	1410	2	1883	17.0	--	1.0	1400	7.9	10	414	505	0
31...	1445	2	--	18.0	--	1.1	1350	8.0	8.0	412	502	0
JUNE												
14...	1500	2	--	18.0	.67	--	1380	8.0	8.3	426	519	0
26...	1600	2	--	18.5	.99	.99	1410	8.0	7.7	395	482	0
JULY												
02...	1045	2	--	14.0	--	.79	1390	8.0	8.1	415	506	0
11...	1200	2	--	16.5	--	1.3	1410	7.9	10	422	515	0
20...	1315	2	--	17.5	--	.94	1330	7.8	13	408	498	0
AUG.												
03...	1045	2	--	10.5	--	1.8	1400	7.9	11	434	529	0
10...	1415	2	--	13.0	--	1.8	1390	7.9	11	429	523	0

09306058 - WILLOW CREE[illegible] R RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L) (00660)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L) (00671)	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)
APR.												
23...	.52	.12	.04	590	120	100	83	150	2.7	35	5.0	14
MAY												
03...	2.0	.09	.03	610	150	100	87	140	2.5	33	4.2	12
17...	.63	.09	.03	570	150	98	80	130	2.4	33	2.0	9.9
22...	.46	.09	.03	570	150	95	80	130	2.4	33	1.8	10
31...	.19	.12	.04	560	140	94	78	130	2.4	34	1.7	13
JUNE												
14...	.34	.06	.02	570	140	96	80	130	2.4	33	2.3	10
26...	.29	.03	.01	560	160	92	80	140	2.6	35	3.8	9.8
JULY												
02...	.23	.00	.00	540	130	94	75	130	2.4	34	1.7	11
11...	.46	.12	.04	570	140	95	80	130	2.4	33	2.2	12
20...	.35	.03	.01	540	130	91	75	130	2.4	34	2.2	12
AUG.												
03...	.27	.03	.01	560	130	99	76	130	2.4	33	2.0	11
10...	.28	.00	.00	560	140	99	77	180	3.3	41	2.2	11

PROCESS DATE 12/03/74

09306058 - WILLOW CREE[illegible]AR RIO BLANCO, CO.

DISTRICT CODE 0[illegible]

WATER QUALITY DATA, WATER YEAR OC[illegible]R 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BERYL-LIUM (BE) (UG/L) (01010)	DIS-SOLVED BISMUTH (BI) (UG/L) (01015)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	DIS-SOLVED COPPER (CU) (UG/L) (01040)
APR.												
23...	450	.5	16	--	--	--	--	--	--	--	--	--
MAY												
03...	440	.5	17	--	--	--	--	--	--	--	--	--
17...	380	.3	17	1	--	--	--	--	--	--	--	--
22...	380	.3	16	1	55	<6	<13	120	0	<9	<20	<4
31...	370	1.3	16	2	0	--	--	130	1	--	--	2
JUNE												
14...	340	.4	17	1	200	--	--	140	0	--	--	2
26...	360	.4	16	1	<100	--	--	120	6	--	--	17
JULY												
02...	360	.3	15	3	<100	--	--	120	0	--	--	1
11...	380	.3	17	2	<100	--	--	130	2	--	--	9
20...	360	.3	16	0	0	--	--	60	1	--	--	8
AUG.												
03...	360	.3	15	1	0	--	--	130	1	--	--	6
10...	500	.3	18	1	0	--	--	130	1	--	--	5

09306058 - WILLOW CREEK [illegible] RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED MOLYB-DENUM (MO) (UG/L) (01060)	DIS-SOLVED NICKEL (NI) (UG/L) (01065)	DIS-SOLVED SILVER (AG) (UG/L) (01075)	DIS-SOLVED STRON-TIUM (SR) (UG/L) (01080)	DIS-SOLVED VANA-DIUM (V) (UG/L) (01085)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED TIN (SN) (UG/L) (01100)	DIS-SOLVED ALUM-INUM (AL) (UG/L) (01106)
APR.											
23...	150	--	30	--	--	--	--	--	--	--	--
MAY											
03...	40	--	20	--	--	--	--	--	--	--	--
17...	20	--	40	--	--	--	--	--	--	--	--
22...	20	<20	20	<6	<9	<2	3000	<9.0	8	<13	50
31...	30	3	10	--	--	--	--	--	30	--	--
JUNE											
14...	90	8	0	--	--	--	--	--	30	--	--
26...	40	4	20	--	--	--	--	--	20	--	--
JULY											
02...	20	3	0	--	--	--	--	--	30	--	--
11...	20	5	20	--	--	--	--	--	10	--	--
20...	60	3	50	--	--	--	--	--	30	--	--
AUG.											
03...	40	2	20	--	--	--	--	--	40	--	--
10...	20	3	20	--	--	--	--	--	20	--	--

PROCESS DA /03/74
DISTRICT CODE 08

09306058 - WILLOW CREEK RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED GALLIUM (GA) (UG/L) (01120)	DIS-SOLVED GER-MANIUM (GE) (UG/L) (01125)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED TI-TANIUM (TI) (UG/L) (01150)	DIS-SOLVED ZIR-CONIUM (ZR) (UG/L) (01160)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
APR.											
23...	--	--	--	--	--	--	1100	3.24	1.50	--	6273
MAY											
03...	--	--	--	--	--	--	1080	4.87	1.47	--	6273
17...	--	--	--	1	--	--	976	2.90	1.33	.0	6273
22...	<9	<20	8	1	<9	<30	964	2.81	1.31	.0	6273
31...	--	--	10	1	--	--	953	2.91	1.30	.0	6273
JUNE											
14...	--	--	10	1	--	--	933	1.69	1.27	.0	6273
26...	--	--	10	1	--	--	941	2.52	1.28	.1	6273
JULY											
02...	--	--	0	1	--	--	938	2.00	1.28	.0	6273
11...	--	--	0	2	--	--	973	3.49	1.32	.0	6273
20...	--	--	0	1	--	--	934	2.37	1.27	.0	6273
AUG.											
03...	--	--	0	2	--	--	956	4.65	1.30	.0	6273
10...	--	--	0	0	--	--	1150	5.65	1.56	.0	6273

PROCESS DA /03/74
DISTRICT CODE 08

09306058 - WILLOW CREEK RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	TIME	TYPE	TEMPERATURE (DEG C) (00010)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	ALKALINITY AS CACO3 (MG/L) (00410)	BICARBONATE (HCO3) (MG/L) (00440)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L) (00660)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L) (00671)	HARDNESS (CA,MG) (MG/L) (00900)	NONCARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)
OCT.												
04...	1420	2	11.5	1370	409	499	.42	.09	.03	460	51	64

PROCESS DAT 03/74
DISTRICT CODE 08

09306058 - WILLOW CREEK RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BORON (B) (UG/L) (01020)
OCT.												
04...	73	130	2.6	38	2.3	10	330	.4	17	1	0	70

PROCESS 2/03/74
DISTRICT CODE 08

09306058 - WILLOW CREE R RIO BLANCO, CO.

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
OCT.												
04...	0	2	20	1	0	10	0	1	875	1.19	.0	6273

PROCESS D/ ?/03/74

09306061 - PICEANCE CR HUNTER C, NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	TYPE	SAMPLE NUMBER (00008)	TEMPERATURE (DEG C) (00010)	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	PH (UNITS) (00400)	CARBON DIOXIDE (CO2) (MG/L) (00405)	ALKALINITY AS CACO3 (MG/L) (00410)	BICARBONATE (HCO3) (MG/L) (00440)	CARBONATE (CO3) (MG/L) (00445)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)
APR.												
23...	1815	2	--	14.0	29	1190	8.2	5.3	430	524	0	.60
MAY												
03...	1645	2	--	7.5	30	1140	8.2	5.2	419	511	0	.64
17...	1400	2	--	11.0	6.3	1510	8.1	8.0	518	631	0	.62
22...	1545	2	1884	16.0	6.2	1590	8.2	6.8	553	674	0	.35
31...	1345	2	--	18.0	6.0	1560	8.2	6.8	550	671	0	.15
JUNE												
14...	1410	2	--	21.5	4.6	1540	8.2	6.4	522	636	0	.08
21...	1600	2	--	23.0	5.5	1540	8.2	6.5	527	643	0	.08
26...	1730	2	--	20.0	4.6	1660	8.0	11	549	669	0	.13
JULY												
02...	1115	2	--	16.0	6.0	1630	8.2	7.0	566	690	0	.19
11...	1330	2	--	21.0	4.6	1580	7.9	12	508	619	0	.22
20...	1215	2	--	14.5	31	1140	7.6	20	403	491	0	.68
AUG.												
10...	1415	2	--	18.0	19	1340	8.1	7.6	493	601	0	.78
31...	1445	2	--	18.0	17	1320	--	--	458	558	--	.33
SEP.												
26...	1530	2	--	15.5	10	1330	--	--	452	551	--	.35

PROCESS DATE [illegible]/03/74

09306061 - PICEANCE CREE[illegible]UNTER C, NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED ORTHO PHOS-PHATE (PO4) (MG/L) (00660)	DIS-SOLVED ORTHO. PHOS-PHORUS (P) (MG/L) (00671)	HARD-NESS (CA,MG) (MG/L) (00900)	NON-CAR-BONATE HARD-NESS (MG/L) (00902)	DIS-SOLVED CAL-CIUM (CA) (MG/L) (00915)	DIS-SOLVED MAG-NE-SIUM (MG) (MG/L) (00925)	DIS-SOLVED SODIUM (NA) (MG/L) (00930)	SODIUM AD-SORP-TION RATIO (00931)	PERCENT SODIUM (00932)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L) (00935)	DIS-SOLVED CHLO-RIDE (CL) (MG/L) (00940)	DIS-SOLVED SULFATE (SO4) (MG/L) (00945)
APR.												
23...	.12	.04	410	0	75	55	120	2.6	38	3.3	13	220
MAY												
03...	.03	.01	400	0	73	54	120	2.6	39	3.7	11	220
17...	.12	.04	510	0	79	76	170	3.3	42	3.8	14	350
22...	.15	.05	540	0	83	82	180	3.4	42	3.9	15	350
31...	.09	.03	540	0	84	81	180	3.4	42	4.2	15	350
JUNE												
14...	.06	.02	520	0	77	80	180	3.4	43	4.2	16	330
21...	.03	.01	520	0	78	79	180	3.4	43	4.0	15	340
26...	.09	.03	540	0	77	84	200	3.8	44	6.4	16	360
JULY												
02...	.00	.00	570	6	84	88	180	3.3	40	3.8	15	350
11...	.21	.07	530	22	77	82	200	3.8	45	4.1	16	380
20...	.09	.03	370	0	72	47	120	2.7	41	5.5	13	220
AUG.												
10...	.18	.06	450	0	79	62	150	3.1	42	4.3	15	270
31...	.09	.03	450	0	75	64	150	3.1	42	4.2	15	280
SEP.												
26...	.09	.03	470	16	77	67	140	2.8	39	3.6	12	280

PROCESS D [illegible] 2/03/74

09306061 - PICEANCE CR[illegible] HUNTER C. NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BERYL-LIUM (BE) (UG/L) (01010)	DIS-SOLVED BISMUTH (BI) (UG/L) (01015)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED CHRO-MIUM (CR) (UG/L) (01030)	DIS-SOLVED COBALT (CO) (UG/L) (01035)	DIS-SOLVED COPPER (CU) (UG/L) (01040)
APR.											
23...	1.0	16	--	--	--	--	--	--	--	--	--
MAY											
03...	.9	17	--	--	--	--	--	--	--	--	--
17...	.7	19	1	--	--	--	--	--	--	--	--
22...	.6	18	2	70	<7	<14	190	0	<10	<20	<5
31...	1.5	17	3	0	--	--	240	1	--	--	2
JUNE											
14...	.7	16	3	100	--	--	240	1	--	--	9
21...	.6	16	3	0	--	--	240	0	--	--	2
26...	.7	15	3	<100	--	--	240	1	--	--	3
JULY											
02...	.6	17	6	<100	--	--	250	0	--	--	1
11...	.7	14	4	<100	--	--	270	2	--	--	5
20...	.5	12	3	0	--	--	320	1	--	--	20
AUG.											
10...	.7	20	3	0	--	--	230	<1	--	--	3
31...	.7	18	2	100	--	--	230	<1	--	--	6
SEP.											
26...	.8	18	0	0	--	--	180	<1	--	--	6

09306061 - PICEANCE CREE [illegible] HUNTER C, NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED MOLYB-DENUM (MO) (UG/L) (01060)	DIS-SOLVED NICKEL (NI) (UG/L) (01065)	DIS-SOLVED SILVER (AG) (UG/L) (01075)	DIS-SOLVED STRON-TIUM (SR) (UG/L) (01080)	DIS-SOLVED VANA-DIUM (V) (UG/L) (01085)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED TIN (SN) (UG/L) (01100)	DIS-SOLVED ALUM-INUM (AL) (UG/L) (01106)
APR.											
23...	110	--	30	--	--	--	--	--	--	--	--
MAY											
03...	20	--	10	--	--	--	--	--	--	--	--
17...	20	--	60	--	--	--	--	--	--	--	--
22...	50	<20	70	7	<10	<3	2400	<10	<10	<15	50
31...	20	7	100	--	--	--	--	--	20	--	--
JUNE											
14...	20	8	100	--	--	--	--	--	20	--	--
21...	20	5	110	--	--	--	--	--	20	--	--
26...	50	4	190	--	--	--	--	--	30	--	--
JULY											
02...	30	2	150	--	--	--	--	--	20	--	--
11...	20	3	150	--	--	--	--	--	10	--	--
20...	130	4	70	--	--	--	--	--	50	--	--
AUG.											
10...	70	2	80	--	--	--	--	--	20	--	--
31...	880	8	10	--	--	--	--	--	10	--	--
SEP.											
26...	40	2	20	--	--	--	--	--	10	--	--

PROCESS DATE 03/74

09306061 - PICEANCE CRE UNTER C. NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	DIS-SOLVED GALLIUM (GA) (UG/L) (01120)	DIS-SOLVED GER-MANIUM (GE) (UG/L) (01125)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED TI-TANIUM (TI) (UG/L) (01150)	DIS-SOLVED ZIR-CONIUM (ZR) (UG/L) (01160)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
APR.											
23...	--	--	--	--	--	--	765	60.3	1.04	--	6214
MAY											
03...	--	--	--	--	--	--	754	61.1	1.03	--	6214
17...	--	--	--	0	--	--	1030	17.6	1.40	.0	6214
22...	<10	<20	6	1	<10	<30	1070	18.0	1.46	.0	6214
31...	--	--	10	1	--	--	1060	17.4	1.44	.0	6214
JUNE											
14...	--	--	10	2	--	--	1020	12.8	1.39	.0	6214
21...	--	--	10	1	--	--	1030	15.4	1.40	.0	6214
26...	--	--	0	1	--	--	1090	13.7	1.48	.0	6214
JULY											
02...	--	--	0	2	--	--	1080	17.5	1.47	.0	6214
11...	--	--	0	1	--	--	1080	13.5	1.47	.0	6214
20...	--	--	0	0	--	--	736	61.6	1.00	.0	6214
AUG.											
10...	--	--	0	1	--	--	901	48.4	1.23	.5	6214
31...	--	--	0	1	--	--	885	40.6	1.20	.0	6214
SEP.											
26...	--	--	0	1	--	--	872	24.0	1.19	.0	6214

PROCESS DAT 03/74

09306061 - PICEANCE CRE HUNTER C. NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	TIME	TYPE	TEMPERATURE (DEG C) (00010)	INSTANTANEOUS DISCHARGE (CFS) (00061)	SPECIFIC CONDUCTANCE (MICROMHOS) (00095)	ALKALINITY AS CACO3 (MG/L) (00410)	BICARBONATE (HCO3) (MG/L) (00440)	DISSOLVED NITRITE PLUS NITRATE (N) (MG/L) (00631)	DISSOLVED ORTHO PHOSPHATE (PO4) (MG/L) (00660)	DISSOLVED ORTHO. PHOSPHORUS (P) (MG/L) (00671)
OCT.										
24...	1015	2	10.0	6.2	1550	542	661	.27	.12	.04

PROCESS DAT[illegible]/03/74

09306061 - PICEANCE CRE[illegible] HUNTER C, NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	HARDNESS (CA,MG) (MG/L) (00900)	NON-CARBONATE HARDNESS (MG/L) (00902)	DISSOLVED CALCIUM (CA) (MG/L) (00915)	DISSOLVED MAGNESIUM (MG) (MG/L) (00925)	DISSOLVED SODIUM (NA) (MG/L) (00930)	SODIUM ADSORPTION RATIO (00931)	PERCENT SODIUM (00932)	DISSOLVED POTASSIUM (K) (MG/L) (00935)	DISSOLVED CHLORIDE (CL) (MG/L) (00940)	DISSOLVED SULFATE (SO4) (MG/L) (00945)
OCT. 24...	530	0	83	78	170	3.2	41	4.3	14	330

PROCESS DATE [illegible]/74

09306061 - PICEANCE CREEK AB [illegible]UNTER C. NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

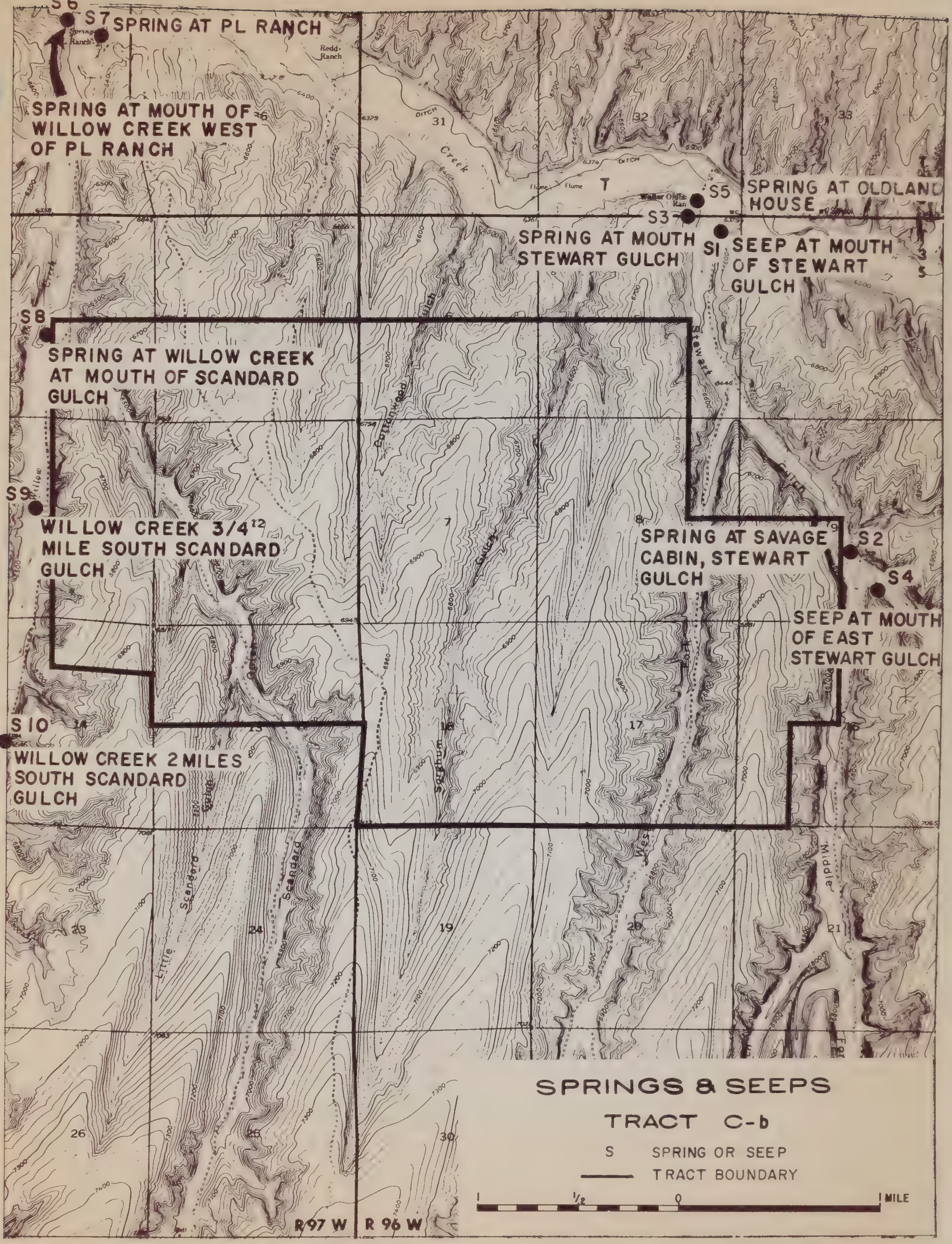
DATE	DIS-SOLVED FLUO-RIDE (F) (MG/L) (00950)	DIS-SOLVED SILICA (SIO2) (MG/L) (00955)	DIS-SOLVED ARSENIC (AS) (UG/L) (01000)	DIS-SOLVED BARIUM (BA) (UG/L) (01005)	DIS-SOLVED BORON (B) (UG/L) (01020)	DIS-SOLVED CAD-MIUM (CD) (UG/L) (01025)	DIS-SOLVED COPPER (CU) (UG/L) (01040)	DIS-SOLVED IRON (FE) (UG/L) (01046)	DIS-SOLVED LEAD (PB) (UG/L) (01049)
OCT.									
24...	.6	19	2	0	170	0	2	30	2

09306061 - PICEANCE CREEK AB. HUNTER C, NEAR RIO BLANCO, CO. DISTRICT CODE 08

WATER QUALITY DATA, WATER YEAR OCTOBER 1974 TO SEPTEMBER 1975

DATE	DIS-SOLVED MAN-GANESE (MN) (UG/L) (01056)	DIS-SOLVED ZINC (ZN) (UG/L) (01090)	DIS-SOLVED LITHIUM (LI) (UG/L) (01130)	DIS-SOLVED SELE-NIUM (SE) (UG/L) (01145)	DIS-SOLVED SOLIDS (SUM OF CONSTI-TUENTS) (MG/L) (70301)	DIS-SOLVED SOLIDS (TONS PER DAY) (70302)	DIS-SOLVED SOLIDS (TONS PER AC-FT) (70303)	DIS-SOLVED MERCURY (HG) (UG/L) (71890)	ELEV. OF LAND SURFACE DATUM (FT. ABOVE MSL) (72000)
OCT.									
24...	170	20	0	1	1030	17.5	1.40	.0	6214

Springs and Seeps


S6
S7 SPRING AT PL RANCH
SPRING AT MOUTH OF WILLOW CREEK WEST OF PL RANCH
Redd Ranch
Spring Ranch
Creek
DITCH
Flume
S5 SPRING AT OLDLAND HOUSE
S3 SPRING AT MOUTH STEWART GULCH
S1 SEEP AT MOUTH OF STEWART GULCH
S8 SPRING AT WILLOW CREEK AT MOUTH OF SCANDARD GULCH
S9 WILLOW CREEK 3/4 MILE SOUTH SCANDARD GULCH
S2 SPRING AT SAVAGE CABIN, STEWART GULCH
S4 SEEP AT MOUTH OF EAST STEWART GULCH
S10 WILLOW CREEK 2 MILES SOUTH SCANDARD GULCH
Cottonwood Gulch
Stewart Gulch
Sorghum Gulch
Little Scandard
Scandard
Middle
West
Willow
31
32
33
7
8
9
12
13
14
16
17
18
19
20
21
23
24
25
26
30
S SPRING OR SEEP
TRACT BOUNDARY
1
1/2
0
1 MILE
R97 W
R 96 W

SPRINGS & SEEPS

TRACT C-b

FIGURE II A-2

TABLE II A-12

WATER QUALITY ANALYSIS

SEEPS and SPRINGS [(a)]

Location: (See Map) (unless stated otherwise, all units are mg/l)

	Element Measured	1	2	3	4	5 (b)	6	7	8	9	10
1.	Aluminum	.06	.1	.3	0.1	.1	1.3	2.3	.2	.2	6.1
2.	Ammonia	.1	<.1	<.1	<.1	<.1	<.1	<.1	0.1	0.1	0.1
3.	Arsenic	.003	.004	.003		.002	.03	.004		.002	.002
4.	Barium	.02	.05	.01	.05	.03	.03	0.01	.06	.05	.05
5.	Beryllium	<.005	.002	<.006	.001	<.003	<.007	<.007	<.007	<.003	<.001
6.	Bicarbonate	520	495	520	480	276	560	520	606	516	540
7.	Bismuth	<.005	<.006	<.006	<.007	<.003	<.007	<.007	<.007	<.003	<.001
8.	Boron	1.4	1.2	1.1	1.2	1.4	1.6	1.6	0.2	0.4	0.6
9.	Cadmium	<.005	<.006	<.006	<.007	<.003	<.007	<.007	<.007	<.003	<.001
10.	Calcium	100	82	92	66	93	102	116	143	130	161
11.	Carbonate	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
12.	Cerium	<.005	<.006	<.006	.005	.002	<.007	<.007	.005	.002	.002
13.	Chloride	[illegible]	4.8	4.8	3.5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
14.	Chromium, Hexavalent	[illegible]	<.01	[illegible]	<.01	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15.	Cobalt	0.002	<.005	.004	0.03	.005	0.01	0.002	.02	.05	.002
16.	Conductivity, Specific	1380	1145	1250	1100	1320	1250	1260	1280	1180	1180
17.	Copper	.04	.04	.03	.2	.1	.05	.03	.2	.1	.03
18.	Fluoride	.9	.6	.7	.6	.6	2.1	1.5	1.7	1.5	1.4
19.	Gallium	<.005	<.006	<.006	.006	.002	0.005	0.006	<.007	<.003	<.001
20.	Hardness, Total	484	536	380	548	510	512	512	576	512	516
21.	Hydroxide	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
22.	Iron	1.8	.5	4.0	7.8	2.0	.8	.7	.14	.84	.7
23.	Lead	<.005	.01	.02	.04	.01	.03	.03	<.007	<.003	.02
24.	Lithium	.05		.03	.3	.07	.4	.1	.1	.5	.2
25.	Magnesium	57	61	37	93	67	63	54	53	46	28
26.	Manganese	.2	.02	.04	1.4	.05	.03	.01	.1	.05	.06
27.	Mercury	.001	.001	.002	.001	.0019	.0017	.0003	.0001	.0001	.0014
28.	Molybdenum	<.005	<.006	<.006	.013	0.03	0.01	<.007	.06	.2	.02
29.	Nickel	0.02	.004	.01	.08	0.03	0.01	0.009	.01	.02	.005
30.	Nitrate	8.1	5.4	5.6	6.0	3.9	2.7	2.9	1.1	1.7	.1
31.	pH	7.9	8.0	7.6	7.8	5.3	8.2	8.1	7.9	8.1	7.9
32.	Phosphate, Total	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1	<.1
33.	Potassium										
34.	Selenium	.005	<.006	<.006	<.007	<.003	<.007	<.007	<.007	<.003	<.001
35.	Silica	12	13	13	13	15	15	16	13	14	13
36.	Silver	<.005	<.006	<.006	<.007	<.003	<.007	<.007	<.007	<.003	<.001
37.	Sodium	200	110	195	90	82	163	147	138	152	125
38.	Solids, Dissolved	1078	875	972	805	679	988	967	995	948	910
39.	Strontium	1	3	2	4	2	5	2	3	1	1
40.	Sulfate	[illegible]	335	370	290	400	360	375	350	352	320
41.	Titanium	[illegible]	[illegible]	[illegible]	0.1	[illegible]	[illegible]	0.2	[illegible]	[illegible]	[illegible]
42.	Vanadium	0.004	.005	.002	.009	.005	0.004	0.004	.003	.005	.002
43.	Yttrium	<.005	.002	<.006	.003	<.003	<.007	<.007	<.007	<.003	<.001
44.	Zinc	0.04	.1	.3	.1	.2	0.4	.08	.05	.2	.2
45.	Zirconium	<.005	<.006	<.006	<.007	<.003	<.007	<.007	<.007	<.003	<.001
46.	Radioactivity										
	Gross Alpha (pcl)	2.8	2.1	3.4	4	4.6	3.3	1.6	4.2	4.7	1.3
	Radium 226*								0.3	0	
	Gross Beta (pcl)	0	0	0	0	0	0	0	0	0	0
	Thorium 230**										
	Uranium**										
47.	Total Organic Carbon (TOC)	6	3	4	3	3	3	6	3	3	6
	Dissolved Organic Carbon***										
	Suspended Organic Carbon***										
	Phenols***										
	Sulfate, Acid Extraction***										
	Nitrogen, Base Extraction***										

* To be reported if gross alpha is greater than 4 picocuries per liter (pcl).
** To be reported if gross beta is greater than 100 picocuries per liter (pcl).
*** To be reported if TOC is greater than 10 mg. per liter.

1. Seep @ Mouth Stewart Creek 2. East Stewart Gulch Stream from Seeps @ Mouth 3. Spring at Mouth of Stewart Gulch 4. Spring at Savage Cabin Stewart Gulch 5. Spring @ Oldland House 6. Spring @ Mouth of Willow Creek West of PL Ranch 7. Spring @ PL Ranch 8. Spring @ Willow Creek at Mouth of Scandard 9. Willow Creek 3/4 mile past Scandard 10. Willow Creek 2 miles past Scandard

(a) all samples taken during week of September 30, 1974

(b) suspected sampling error involving stagnant water; will be investigated.

WATER QUALITY ANALYSES

SEEPS AND SPRINGS

TRACT C-b

THE INDUSTRIAL LABORATORIES COMPANY

Analytical and Consulting Chemists

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TELEPHONE 455-3641

ANALYSIS REPORT

ATLANTIC RICHFIELD COMPANY

DATE RECEIVED: 10/17/74
DATE REPORTED: 10/29/74

LAB. NUMBER: 3778

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SAMPLE MARKED: Seep at Mouth of Middle Stewart Creek (S1)

ANALYSIS:

	MILLIGRAMS PER LITER		MILLI-EQUIVALENTS
Calcium	100		4.990
Magnesium	57		4.691
Sodium	200	Σ Cations = 18.38	8.695
Carbonate	Less than 0.1	Σ Anions = 17.81	----
Bicarbonate	520	% Difference = 1.6	8.523
Chloride	4.2		-----
Sulfate	440		9.162
Nitrate	8.1		0.131
Phosphate	Less than 0.1		-----
Silicon dioxide	12		0.400

	MILLIGRAMS PER LITER
Iron	1.8
Fluoride	0.9
Hardness, in terms of calcium carbonate	484
Ammonia	0.1
Lithium	Less than 0.5
Barium	Less than 1.0
Hexavalent chromium	Less than 0.01
Arsenic	Less than 0.01
Selenium	Less than 0.01
Boron	1.4
Hydroxide	Less than 0.1
Aluminum	0.05
Copper	Less than 0.1
Cadmium	Less than 0.01
Lead	Less than 0.05

	MILLIGRAMS PER LITER
Manganese	Less than 0.[illegible]
Silver	Less than 0.01
Zinc	Less than 0.[illegible]
Mercury	Less than 0.01
Total dissolved solids (calculated)	1,078

pH 7.9

Specific conductance 1,330 micromhos per cc

cc: John Matis/Frank Haas

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SAMPLE MARKED: East Stewart Gulch Steeam from Seeps at Mouth (S2)

ANALYSIS:

	MILLIGRAMS PER LITER	MILLI-EQUIVALENTS
Calcium	82	4.092
Magnesium	81	6.666
Sodium	110	4.785
Carbonate	Less than 0.1	-----
Bicarbonate	495	8.118
Chloride	4.8	0.135
Sulfate	335	6.968
Nitrate	5.4	-----
Phosphate	Less than 0.1	-----
Silicon dioxide	13	0.433
Iron	0.5	
Fluoride	0.6	
Hardness, in terms of calcium carbonate	536	
Ammonia	Less than 0.1	
Lithium	Less than 0.5	
Barium	Less than 0.5	
Hexavalent chromium	Less than 0.01	
Arsenic	Less than 0.01	
Selenium	Less than 0.01	
Boron	1.2	
Hydroxide	Less than 0.1	
Aluminum	Less than 0.05	
Copper	Less than 0.1	
Cadmium	Less than 0.01	
Lead	Less than 0.05	

Σ Cations = 15.54
Σ Anions = 15.22
% Difference = 1.0

	MILLIGRAMS PER LITER
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01
Total dissolved solids (calculated)	875

pH 8.0
Specific conductance 1,145 micromhos per cc

cc: Frank Haas/John Matis

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DATE RECEIVED: 10/17/74
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LAB. NUMBER: 3780

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SAMPLE MARKED: Spring at Mouth of Stewart Gulch (S3)

ANALYSIS:	MILLIGRAMS PER LITER	MILLI-EQUIVALENTS
Calcium	92	4.591
Magnesium	37	3.045
Sodium	195	8.483
Carbonate	Less than 0.1	-----
Bicarbonate	520	8.528
Chloride	4.8	-----
Sulfate	370	7.696
Nitrate	5.6	-----
Phosphate	Less than 0.1	-----
Silicon dioxide	13	0.433
Iron	4.0	
Fluoride	0.7	
Hardness, in terms of calcium carbonate	380	
Ammonia	Less than 0.1	
Lithium	Less than 0.5	
Barium	Less than 1.0	
Hexavalent chromium	Less than 0.01	
Arsenic	Less than 0.01	
Selenium	Less than 0.01	
Boron	1.1	
Hydroxide	Less than 0.1	
Aluminum	Less than 0.05	
Copper	Less than 0.1	
Cadmium	Less than 0.01	
Lead	Less than 0.05	

Σ Cations = 16.12
Σ Anions = 16.22
% Difference = 0.3

	MILLIGRAMS PER LITER
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01
Total dissolved solids (calculated)	972

pH 7.6
Specific conductance 1,250 micromhos per cc

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DATE RECEIVED: 10/17/74
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LAB. NUMBER: 3731

SAMPLE MARKED: Spring at Savage Cabins Stewart Gulch (S4)

SAMPLES ARE DISCARDED IN 15 DAYS FROM DATE OF REPORT UNLESS WE ARE REQUESTED, IN WRITING, TO RETAIN THEM FOR A LONGER PERIOD. PERISHABLE SAMPLES ARE USUALLY DISCARDED IMMEDIATELY UNLESS CLIENT HAS REQUESTED SPECIAL HANDLING (FREEZING, ETC.) IN ADVANCE.

ANALYSIS:	MILLIGRAMS PER LITER	MILLI-EQUIVALENTS
Calcium	66	3.278
Magnesium	93	7.654
Sodium	90	3.915
Carbonate	Less than 0.1	-----
Bicarbonate	480	7.872
Chloride	3.5	-----
Sulfate	290	6.032
Nitrate	6.0	-----
Phosphate	Less than 0.1	-----
Silicon dioxide	13	0.433
Iron	7.8	
Fluoride	0.6	
Hardness, in terms of calcium carbonate	548	
Ammonia	Less than 0.1	
Lithium	Less than 0.5	
Barium	Less than 1.0	
Hexavalent chromium	Less than 0.01	
Arsenic	Less than 0.01	
Selenium	Less than 0.01	
Boron	1.2	
Hydroxide	Less than 0.1	
Aluminum	0.1	
Copper	Less than 0.1	
Cadmium	Less than 0.01	
Manganese	0.08	

Σ Cations = 14.85
Σ Anions = 13.90
% Difference = 3.3

	MILLIGRAMS PER LITER
Lead	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01
Total dissolved solids (calculated)	805

pH 7.8
Specific conductance 1,100 micromhos per cc

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DATE REPORTED: 10/29/74

LAB. NUMBER: 3782

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SAMPLE MARKED: Spring at Oland House (S5)

ANALYSIS:

	MILLIGRAMS PER LITER		MILLI-EQUIVALENTS
Calcium	93		4.641
Magnesium	67		5.514
Sodium	82		3.567
Carbonate	Less than 0.1	Σ Cations = 13.72	------
Bicarbonate	276	Σ Anions = 12.85	4.525
		% Difference = 3.3	
Chloride	4.2		-----
Sulfate	400		8.320
Nitrate	3.9		-----
Phosphate	Less than 0.1		-----
Silicon dioxide	15		0.500
Iron	2.0		
Fluoride	0.6		
Hardness, in terms of calcium carbonate	510		
Ammonia	Less than 0.1		
Lithium	Less than 0.5		
Barium	Less than 1.0		
Hexavalent chromium	Less than 0.01		
Arsenic	Less than 0.01		
Selenium	Less than 0.01		
Boron	1.4		
Hydroxide	Less than 0.1		
Aluminum	0.05		
Copper	Less than 0.1		
Cadmium	Less than 0.01		
Lead	Less than 0.05		

	MILLIGRAMS PER LITER
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01
Total dissolved solids (calculated)	679

pH 5.3
Specific conductance 1,320 micromhos per cc

cc: John Hatis/Frank Haas

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ATLANTIC RICHFIELD COMPANY
1500 Security Life Building
Denver, Colorado 80202

Attn: Don Tait

DATE RECEIVED: 10/17/74
DATE REPORTED: 11/4/74

LAB. NUMBER: 3783

SAMPLES ARE DISCARDED IN 15 DAYS FROM DATE OF REPORT UNLESS WE ARE REQUESTED, IN WRITING, TO RETAIN THEM FOR A LONGER PERIOD. PERISHABLE SAMPLES ARE USUALLY DISCARDED IMMEDIATELY UNLESS CLIENT HAS REQUESTED SPECIAL HANDLING (FREEZING, ETC.) IN ADVANCE.

SAMPLE MARKED: Spring at Mouth of Willow Creek West of BL Ranch (S6)

ANALYSIS:

	MILLIGRAMS PER LITER		MILLI-EQUIVALENTS
Calcium	102		5.090
Magnesium	63		5.185
Sodium	163		7.091
Carbonate	Less than 0.1	Σ Cations = 17.37	------
Bicarbonate	560	Σ Anions = 16.77	9.184
		% Difference = 1.8	
Chloride	Less than 4.0		-----
Sulfate	360		7.480
Nitrate	2.7		-----
Phosphate	Less than 0.1		-----
Silicon dioxide	15		0.500
Iron	Less than 0.05		
Fluoride	2.1		
P. alkalinity, in terms of calcium carbonate	---		
MO alkalinity, in terms of calcium carbonate	---		
Hardness, in terms of calcium carbonate	512		
Total dissolved solids	968		
Ammonia	Less than 0.1		
Lithium	Less than 0.5		
Barium	Less than 1.0		
Hexavalent chromium	Less than 0.01		
Arsenic	Less than 0.01		
Selenium	Less than 0.01		
Boron	1.6		
Hydroxide	Less than 0.1		

	MILLIGRAMS PER LITER
Aluminum	1.3
Copper	Less than 0.1
Cadmium	Less than 0.01
Lead	Less than 0.05
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01

pH 8.2
Specific conductance 1,250 micromhos per

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ANALYSIS REPORT

ATLANTIC RICHFIELD

DATE RECEIVED: 1 /1[illegible]/[illegible]
DATE REPORTED: 11/[illegible]/74

LAB. NUMBER: 37[illegible]4

SAMPLES ARE DISCARDED IN 15 DAYS FROM DATE OF REPORT UNLESS WE ARE REQUESTED, IN WRITING, TO RETAIN THEM FOR A LONGER PERIOD. PERISHABLE SAMPLES ARE USUALLY DISCARDED IMMEDIATELY UNLESS CLIENT HAS REQUESTED SPECIAL HANDLING (FREEZING, ETC.) IN ADVANCE.

SAMPLE MARKED: Spring at PL Ranch (S7)

ANALYSIS:

	MILLIGRAMS PER LITER	MILLI-EQUIVALENTS
Calcium	116	5.788
Magnesium	54	4.444
Sodium	147	6.395
Carbonate	Less than 0.1	-----
Bicarbonate	520	8.523
Chloride	Less than 4.0	-----
Sulfate	375	7.808
Nitrate	2.3	-----
Phosphate	Less than 0.1	-----
Silicon dioxide	16	0.533

Σ Cations = 16.63
Σ Anions = 16.43
% Difference = 0.6

Iron	0.29
Fluoride	1.5
P. alkalinity, in terms of calcium carbonate	---
MO alkalinity, in terms of calcium carbonate	---
Hardness, in terms of calcium carbonate	512
Total dissolved solids (calculated)	967
Ammonia	Less than 0.1
Lithium	Less than 0.5
Barium	Less than 1.0
Hexavalent chromium	Less than 0.02
Arsenic	Less than 0.01
Selenium	Less than 0.01
Boron	1.6
Hydroxide	Less than 0.1

	MILLIGRAMS PER LITER
Aluminum	[illegible]
Copper	Less than 0.1
Cadmium	Less than 0.01
Lead	Less than 0.05
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01

pH 8.1
Specific conductance 1,200 micromhos per cc

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ATLANTIC RICHFIELD COMPANY

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LAB. NUMBER: [illegible]

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AMPLE MARKED: Spring of Willow Creek at South of Scandard
(S8)

ANALYSIS:

	MILLIGRAMS PER LITER	MILLI-EQUIVALENTS
Calcium	143	7.136
Magnesium	53	[illegible]
Sodium	138	6.003
Carbonate	Less than 0.1	----
Bicarbonate	600	9.834
Chloride	Less than 4.0	---
Sulfate	350	7.280
Nitrate	1.1	---
Phosphate	Less than 0.1	---
Silicon dioxide	13	0.705

Σ Cations = 17.50
Σ Anions = 17.32
% Difference = 0.5

Iron	0.14
Fluoride	1.7
P. alkalinity, in terms of calcium carbonate	--
MO alkalinity, in terms of calcium carbonate	--
Hardness, in terms of calcium carbonate	576
Total dissolved solids	995
Lithium	Less than 0.5
Ammonia	0.1
Barium	Less than 1.0
Hexavalent chromium	Less than 0.01
Arsenic	Less than 0.01
Selenium	Less than 0.01
Boron	0.2
Hydroxide	Less than 0.1

	MILLIGRAMS PER LITER
Aluminum	Less than 0.5
Copper	Less than 0.1
Cadmium	Less than 0.01
Lead	Less than 0.05
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01

pH 7.9
Specific conductance 1,200 micromhos per cc

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ANALYSIS REPORT

ATLANTIC RICHFIELD COMPANY

DATE RECEIVED: 10/17/74
DATE REPORTED: 11/4/74

LAB. NUMBER: 3792

AMPLE MARKED: Willow Creek 3/4 Miles past Scandard (S9)

SAMPLES ARE DISCARDED IN 15 DAYS FROM DATE OF REPORT UNLESS WE ARE REQUESTED, IN WRITING, TO RETAIN THEM FOR A LONGER PERIOD. PERISHABLE SAMPLES ARE USUALLY DISCARDED IMMEDIATELY UNLESS CLIENT HAS REQUESTED SPECIAL HANDLING (FREEZING, ETC.) IN ADVANCE.

ANALYSIS:

	MILLIGRAMS PER LITER	MILLI-EQUIVALENTS
Calcium	130	6.487
Magnesium	46	3.786
Sodium	152	6.612
Carbonate	Less than 0.1	----
Bicarbonate	515	8.462
Chloride	Less than 4.0	---
Sulfate	350	7.289
Nitrate	1.7	---
Phosphate	Less than 0.1	---
Silicon dioxide	14	0.466

Σ Cations = 16.89
Σ Anions = 15.84
% Difference = 3.2

Iron	0.64
Fluoride	1.5
P. alkalinity, in terms of calcium carbonate	--
MO alkalinity, in terms of calcium carbonate	--
Hardness, in terms of calcium carbonate	512
Total dissolved solids	948
Ammonia	0.1
Lithium	Less than 0.5
Barium	Less than 1.0
Hexavalent chromium	Less than 0.01
Arsenic	Less than 0.01
Selenium	Less than 0.01
Boron	0.4
Hydroxide	Less than 0.1

	MILLIGRAMS PER LITER
Aluminum	Less than [illegible]
Copper	Less than 0.1
Cadmium	Less than 0.01
Lead	Less than 0.05
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01

pH 8.1
Specific conductance 1,180 micromhos per cc

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ANALYSIS REPORT

ATLANTIC RICHFIELD COMPANY

DATE RECEIVED: 10/17/74
DATE REPORTED: 11/4/74

LAB. NUMBER: 3703

SAMPLES ARE DISCARDED IN 15 DAYS FROM DATE OF REPORT UNLESS WE ARE REQUESTED, IN WRITING, TO RETAIN THEM FOR A LONGER PERIOD. PERISHABLE SAMPLES ARE USUALLY DISCARDED IMMEDIATELY UNLESS CLIENT HAS REQUESTED SPECIAL HANDLING (FREEZING, ETC.) IN ADVANCE.

SAMPLE MARKED: Willow Creek 2 Miles Past Scandard (S10)

ANALYSIS:

	MILLIGRAMS PER LITER	MILLI-EQUIVALENTS
Calcium	161	8.034
Magnesium	28	2.304
Sodium	125	5.399
Carbonate	Less than 0.1	---
Bicarbonate	540	8.856
Chloride	0.8	---
Sulfate	310	6.448
Nitrate	0.1	---
Phosphate	Less than 0.1	---
Silicon dioxide	13	0.433
Iron	0.47	
Fluoride	1.4	
P. alkalinity, in terms of calcium carbonate	--	
MO alkalinity, in terms of calcium carbonate	--	
Hardness, in terms of calcium carbonate	515	
Total dissolved solids	910	
Ammonia	0.1	
Lithium	Less than 0.5	
Barium	Less than 1.0	
Hexavalent chromium	Less than 0.01	
Selenium	Less than 0.01	
Arsenic	Less than 0.01	
Boron	0.6	
Hydroxide	Less than 0.1	

Σ Cations = 15.74
Σ Anions = 15.40
% Difference = 1.1

	MILLIGRAMS PER LITER
Aluminum	.1
Copper	Less than 0.1
Cadmium	Less than 0.01
Lead	Less than 0.05
Manganese	Less than 0.05
Silver	Less than 0.01
Zinc	Less than 0.5
Mercury	Less than 0.01

pH 7.9
Specific conductance 1,180 micromhos per c

EMBERS OF:
AMERICAN ASS'N OF CEREAL CHEMISTS
AMERICAN CHEMICAL SOCIETY
AMERICAN OIL CHEMISTS' SOCIETY
ASS'N OF OFFICIAL RACING CHEMISTS
BAKERY ENGINEERS OF AMERICA
INSTITUTE OF FOOD TECHNOLOGY
SIGMA XI

THE INDUSTRIAL LABORATORIES COMPANY
H. Paul Ochs
CHEMIST

IS REPORT IS NOT TO BE REPRODUCED, IN WHOLE OR IN PART, FOR ADVERTISING PURPOSES WITHOUT OBTAINING PRIOR WRITTEN AUTHORIZATION

* Test performed on samples marked 'Regular'
** Test performed on samples marked 'Hg for N'

Charles R. Wilson
Charles R. Wilson, Analyst

M L Jacobs
Approved by:
M. L. Jacobs, Ph.D.
Divisional Manager

CRW/dh

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Seep at mouth of Middle Stewart Gulch (S1)

IAD No.: 97-140-002-33

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.004
Thorium		Gadolinium		Molybdenum		Titanium	0.1
Bismuth		Europium		Niobium		Scandium	0.005
Lead		Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium		Potassium	*
Mercury	**0.0011	Praseodymium		Strontium	1	Chlorine	*
Gold		Cerium		Rubidium	0.005	Sulfur	*
Platinum		Lanthanum		Bromine	0.02	Phosphorus	0.4
Iridium		Barium	0.02	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.003	Aluminum	1
Rhenium		Iodine		Germanium		Magnesium	*
Tungsten		Tellurium		Gallium		Sodium	*
Tantalum		Antimony		Zinc	0.04	Fluorine	*
Hafnium		Tin		Copper	0.04	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.02	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.002	Carbon	NR
Thulium		Silver		Iron	1	Boron	0.02
Erbium		Palladium		Manganese	0.2	Beryllium	
Holmium		Rhodium		Chromium	0.005	Lithium	0.05
Dysprosium						Hydrogen	NR

NR — Not Reported
All elements not reported <0.005μg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved: M E Jacobs

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: East Stewart Gulch Stream from Seeps of mouth (S2)

IAD No.: 97-140-002-33

CONCENTRATION IN µg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.005
Thorium		Gadolinium		Molybdenum		Titanium	0.06
Bismuth		Europium		Niobium		Scandium	0.006
Lead	0.01	Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium	0.002	Potassium	*
Mercury	**0.0011	Praseodymium		Strontium	3	Chlorine	*
Gold		Cerium		Rubidium	0.01	Sulfur	*
Platinum		Lanthanum		Bromine	0.02	Phosphorus	0.1
Iridium		Barium	0.05	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.004	Aluminum	0.5
Rhenium		Iodine		Germanium		Magnesium	*
Tungsten		Tellurium		Gallium		Sodium	*
Tantalum		Antimony		Zinc	0.1	Fluorine	*
Hafnium		Tin		Copper	0.04	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.004	Nitrogen	NR
Ytterbium		Cadmium		Cobalt		Carbon	NR
Thulium		Silver		Iron	0.7	Boron	0.02
Erbium		Palladium		Manganese	0.02	Beryllium	0.002
Holmium		Rhodium		Chromium	0.02	Lithium	***
Dysprosium						Hydrogen	NR

NR – Not Reported
All elements not reported <0.006 µg/ml
* Not reported upon request
** Flameless Atomic Absorption
*** Interference

Approved:

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Spring at mouth of Stewart Gulch (S3)

IAD No.: 97-140-002-33

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.002
Thorium		Gadolinium		Molybdenum		Titanium	0.08
Bismuth		Europium		Niobium		Scandium	0.006
Lead	0.02	Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium		Potassium	*
Mercury	**0.0020	Praseodymium		Strontium	2	Chlorine	*
Gold		Cerium		Rubidium	0.008	Sulfur	*
Platinum		Lanthanum		Bromine	0.04	Phosphorus	0.03
Iridium		Barium	0.01	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.003	Aluminum	0.3
Rhenium		Iodine		Germanium		Magnesium	*
Tungsten		Tellurium		Gallium		Sodium	*
Tantalum		Antimony		Zinc	0.3	Fluorine	*
Hafnium		Tin	0.02	Copper	0.03	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.01	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.004	Carbon	NR
Thulium		Silver		Iron	7	Boron	0.01
Erbium		Palladium		Manganese	0.04	Beryllium	
Holmium		Rhodium		Chromium	0.004	Lithium	0.03
Dysprosium						Hydrogen	NR

NR — Not Reported
All elements not reported <0.006μg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved: M Jacobs

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to
INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Spring @ Savage Cabin Stewart Gulch (S4)

IAD No.: 97-140-002-33

CONCENTRATION IN µg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.009
Thorium		Gadolinium		Molybdenum	0.013	Titanium	0.1
Bismuth		Europium		Niobium		Scandium	0.006
Lead	0.04	Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium	0.003	Potassium	*
Mercury	**0.0010	Praseodymium		Strontium	4	Chlorine	*
Gold		Cerium	0.005	Rubidium	0.03	Sulfur	*
Platinum		Lanthanum	0.009	Bromine	0.03	Phosphorus	1
Iridium		Barium	0.05	Selenium		Silicon	*
Osmium		Cesium		Arsenic		Aluminum	>70
Rhenium		Iodine		Germanium	0.007	Magnesium	*
Tungsten		Tellurium		Gallium	0.006	Sodium	*
Tantalum		Antimony		Zinc	0.1	Fluorine	*
Hafnium		Tin	0.04	Copper	0.2	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.08	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.03	Carbon	NR
Thulium		Silver		Iron	23	Boron	0.007
Erbium		Palladium		Manganese	01.4	Beryllium	0.001
Holmium		Rhodium		Chromium	0.04	Lithium	0.3
Dysprosium						Hydrogen	NR

NR — Not Reported
All elements not reported <0. 007 µg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved: M L Jacobs

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

SINCE 1908

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Spring at Oland House (S5)

IAD No.: 97-140-002-33

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.005
Thorium		Gadolinium		Molybdenum	0.03	Titanium	0.02
Bismuth		Europium		Niobium		Scandium	0.005
Lead	0.01	Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium		Potassium	*
Mercury	**0.0019	Praseodymium	0.002	Strontium	2	Chlorine	*
Gold		Cerium	0.002	Rubidium	0.005	Sulfur	*
Platinum		Lanthanum	0.002	Bromine	0.02	Phosphorus	0.3
Iridium		Barium	0.03	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.002	Aluminum	0.1
Rhenium		Iodine		Germanium		Magnesium	*
Tungsten		Tellurium		Gallium	0.002	Sodium	*
Tantalum		Antimony		Zinc	0.2	Fluorine	*
Hafnium		Tin	0.03	Copper	0.1	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.03	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.005	Carbon	NR
Thulium		Silver		Iron	≈6	Boron	0.006
Erbium		Palladium		Manganese	0.05	Beryllium	
Holmium		Rhodium		Chromium	0.01	Lithium	0.07
Dysprosium						Hydrogen	NR

NR -- Not Reported
All elements not reported <0.003μg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved: M L Jacobs

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Spring at mouth of Willow Creek
West of Pl Ranch (S6)

IAD No.: 97-140-002-33

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.004
Thorium		Gadolinium		Molybdenum	0.01	Titanium	0.3
Bismuth		Europium		Niobium		Scandium	0.01
Lead	≤0.03	Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium		Potassium	*
Mercury	**0.0017	Praseodymium		Strontium	5	Chlorine	*
Gold		Cerium		Rubidium	0.04	Sulfur	*
Platinum		Lanthanum		Bromine	0.03	Phosphorus	0.2
Iridium		Barium	0.03	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.03	Aluminum	1
Rhenium		Iodine	0.005	Germanium	0.008	Magnesium	*
Tungsten		Tellurium		Gallium	0.005	Sodium	*
Tantalum		Antimony		Zinc	0.4	Fluorine	*
Hafnium		Tin		Copper	0.05	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.01	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.01	Carbon	NR
Thulium		Silver		Iron	0.8	Boron	0.03
Erbium		Palladium		Manganese	0.03	Beryllium	
Holmium		Rhodium		Chromium	0.03	Lithium	0.4
Dysprosium						Hydrogen	NR

NR – Not Reported
All elements not reported <0.007μg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved: M J Jacobs

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Spring at P1 Ranch (S7)

IAD No.: 97-140-002-33

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.004
Thorium		Gadolinium		Molybdenum		Titanium	0.2
Bismuth		Europium		Niobium		Scandium	0.006
Lead	0.03	Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium		Potassium	*
Mercury	**0.0003	Praseodymium		Strontium	2	Chlorine	*
Gold		Cerium		Rubidium	0.01	Sulfur	*
Platinum		Lanthanum		Bromine	0.01	Phosphorus	0.2
Iridium		Barium	0.01	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.004	Aluminum	0.4
Rhenium		Iodine	0.006	Germanium		Magnesium	*
Tungsten		Tellurium		Gallium	0.006	Sodium	*
Tantalum		Antimony		Zinc	0.08	Fluorine	*
Hafnium		Tin		Copper	0.03	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.009	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.002	Carbon	NR
Thulium		Silver		Iron	0.7	Boron	0.02
Erbium		Palladium		Manganese	0.01	Beryllium	
Holmium		Rhodium		Chromium	0.008	Lithium	0.1
Dysprosium						Hydrogen	NR

NR — Not Reported
All elements not reported <0. 007μg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved: M J Jacobs

COMMERCIAL TESTING & ENGINEERING CO.

GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434

Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Spring of Willow Cr @ mouth of Scandard (S8)

IAD No.: 97-140-002-33

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.003
Thorium		Gadolinium		Molybdenum	0.06	Titanium	0.2
Bismuth		Europium		Niobium		Scandium	0.007
Lead		Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium		Potassium	*
Mercury	**0.0001	Praseodymium		Strontium	3	Chlorine	*
Gold		Cerium	0.005	Rubidium	0.009	Sulfur	*
Platinum		Lanthanum	0.01	Bromine	0.04	Phosphorus	0.07
Iridium		Barium	0.06	Selenium		Silicon	*
Osmium		Cesium		Arsenic		Aluminum	0.2
Rhenium		Iodine		Germanium	0.006	Magnesium	*
Tungsten		Tellurium		Gallium		Sodium	*
Tantalum		Antimony	0.006	Zinc	0.05	Fluorine	*
Hafnium		Tin	0.02	Copper	0.2	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.01	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.02	Carbon	NR
Thulium		Silver		Iron	6	Boron	0.04
Erbium		Palladium		Manganese	0.1	Beryllium	
Holmium		Rhodium		Chromium	0.03	Lithium	0.1
Dysprosium						Hydrogen	NR

NR — Not Reported
All elements not reported <0.007 μg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved:

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Willow Creek 3/4 mi. past Scandard (S9)

IAD No.: 97-140-002-33

CONCENTRATION IN µg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.005
Thorium		Gadolinium		Molybdenum	0.2	Titanium	0.2
Bismuth		Europium		Niobium		Scandium	0.01
Lead		Samarium		Zirconium		Calcium	*
Thallium		Neodymium		Yttrium		Potassium	*
Mercury	**0.0001	Praseodymium		Strontium	1	Chlorine	*
Gold		Cerium	0.002	Rubidium	0.005	Sulfur	*
Platinum		Lanthanum	0.002	Bromine	0.02	Phosphorus	0.04
Iridium		Barium	0.05	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.002	Aluminum	0.2
Rhenium		Iodine	0.002	Germanium		Magnesium	*
Tungsten		Tellurium		Gallium		Sodium	*
Tantalum		Antimony		Zinc	0.2	Fluorine	*
Hafnium		Tin		Copper	0.1	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.02	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.05	Carbon	NR
Thulium		Silver		Iron	2	Boron	0.03
Erbium		Palladium		Manganese	0.05	Beryllium	
Holmium		Rhodium		Chromium	0.03	Lithium	0.5
Dysprosium						Hydrogen	NR

NR — Not Reported
All elements not reported <0.003µg/ml
** Flameless Atomic Absorption
* Not reported upon request

II A-83

Approved:

COMMERCIAL TESTING & ENGINEERING CO.
GENERAL OFFICES: 228 NORTH LA SALLE STREET, CHICAGO, ILLINOIS 60601 · AREA CODE 312 726-8434
Reply to INSTRUMENTAL ANALYSIS DIVISION, 14335 WEST AVENUE, GOLDEN, COLORADO, 80401, PHONE: 303-278-9521

To: Mr. Frank Haas
The Oil Shale Corporation
18200 West Hiway 72
Golden, Colorado 80401

Date: 8 November 74

Analyst: S. Sweeney

P. O. No.:

Sample No.: Willow Creek 2 mi past Scandard (S10)

IAD No.: 97-140-002-33

CONCENTRATION IN μg/ml

ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.	ELEMENT	CONC.
Uranium		Terbium		Ruthenium		Vanadium	0.002
Thorium		Gadolinium		Molybdenum	0.02	Titanium	0.02
Bismuth		Europium		Niobium		Scandium	0.004
Lead	0.02	Samarium		Zirconium		Calcium	*
Thallium		Neodymium	0.005	Yttrium	<0.001	Potassium	*
Mercury	**0.0014	Praseodymium	0.001	Strontium	1	Chlorine	*
Gold		Cerium	0.002	Rubidium	0.005	Sulfur	*
Platinum		Lanthanum	0.005	Bromine	0.01	Phosphorus	0.3
Iridium		Barium	0.05	Selenium		Silicon	*
Osmium		Cesium		Arsenic	0.002	Aluminum	2
Rhenium		Iodine	0.001	Germanium		Magnesium	*
Tungsten		Tellurium		Gallium		Sodium	*
Tantalum		Antimony		Zinc	0.2	Fluorine	*
Hafnium		Tin		Copper	0.03	Oxygen	NR
Lutetium		Indium	STD	Nickel	0.005	Nitrogen	NR
Ytterbium		Cadmium		Cobalt	0.002	Carbon	NR
Thulium		Silver		Iron	0.9	Boron	0.006
Erbium		Palladium		Manganese	0.06	Beryllium	
Holmium		Rhodium		Chromium	0.01	Lithium	0.2
Dysprosium						Hydrogen	NR

NR — Not Reported
All elements not reported <0.001 μg/ml
* Not reported upon request
** Flameless Atomic Absorption

Approved: M J Jacobs

HAZEN ARCH, INC.
4601 Indiana Street
Golden, Colorado 80401

Mr. Frank Haas
The Oil Shale Corporation
18200 West Highway 72
Golden, Colorado 80401

RECEIVED
DEC 2 1974

Date: November 27, 1974
HRI Project No. 535
HRI Series No. 7515
Samples received: Oct. 22, 1974

TOSCO-G REPORT OF ANALYSIS

Analysis No.	Sample Description	pCi/l α Total	±	α Precision*	pCi/l β Total	±	β Precision*	pCi/l Ra^{226}	±	Precision*
7515-1 ✓	Stewart Gulch-Spring at Mouth (S3)	3.4	±	2.7	0	±	11			
-2 ✓	Middle Stewart Gulch (S1)	2.8	±	2.5	0	±	12			
-3 ✓	Savage Cabin-Stewart Gulch (S4)	4.0	±	2.5	0	±	11			
-4 ✓	East Stewart Gulch (S2)	2.1	±	2.2	0	±	12			
-5 ✓	Spring at Oland House (S5)	4.6	±	2.8	0	±	12			
-6 ✓	Willow Creek West of PL Ranch (S6)	3.3	±	2.6	0	±	12			
-7 ✓	Willow Creek 3/4 mi. past Scandard (S9)	4.7	±	2.8	0	±	12	0	±	0.8
-8 ✓	Willow Creek 2 mi. past Scandard (S10)	1.3	±	2.1	0	±	12			
-9 ✓	Willow Creek Mouth-Scandard (S8)	4.2	±	2.8	0	±	12	0.3	±	0.5
-10 ✓	Spring-PL Ranch (S7)	1.6	±	2.2	0	±	12			
-11	A-1	4.3	±	3.4	0	±	15	0.2	±	0.5
-12	A-2 85'	2.3	±	3.6	0	±	14			
-13	A-3 107'	0	±	3.1	0	±	14			
-14	A-5 86'	0	±	3.0	0	±	14			
-15	A-6 60'	2.9	±	4.2	0	±	15			
-16	A-7 57'	14	±	6	6	±	21	0.3	±	0.4
-17	A-8	0	±	2.9	9	±	14			
-18	A-8 70'	1.5	±	3.7	0	±	14			
-19	A-9 57'	0	±	2.6	0	±	13			
-20	9 Core Point-1200'	1.7	±	1.8	0	±	13			

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ

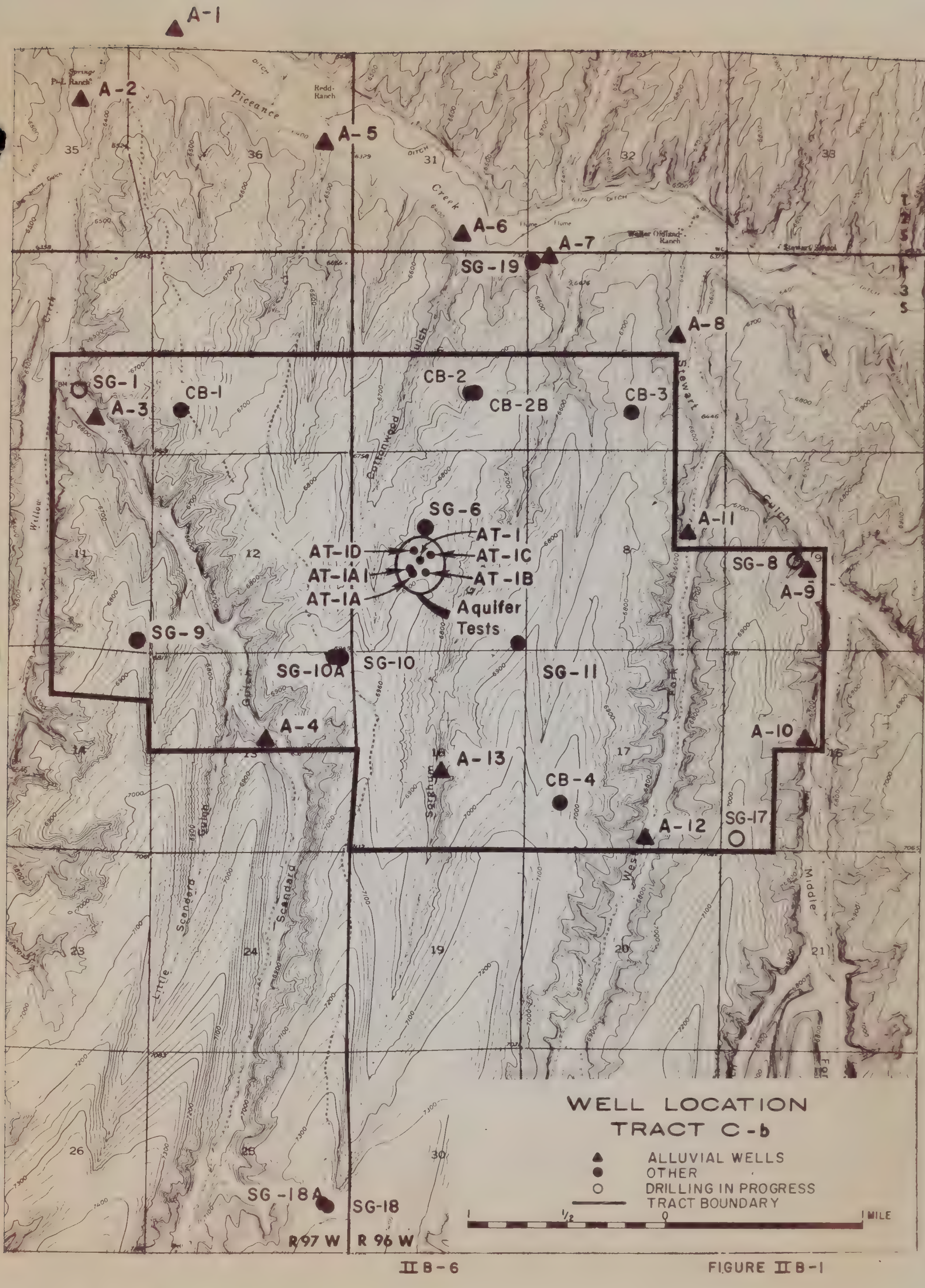
WELL LOCATION
TRACT C-b
▲ ALLUVIAL WELLS
● OTHER
○ DRILLING IN PROGRESS
TRACT BOUNDARY
1 ½ 0 1 MILE
A-1
A-2
A-3
A-4
A-5
A-6
A-7
A-8
A-9
A-10
A-11
A-12
A-13
SG-1
SG-6
SG-8
SG-9
SG-10
SG-10A
SG-11
SG-17
SG-18
SG-18A
SG-19
CB-1
CB-2
CB-2B
CB-3
CB-4
AT-1
AT-1A
AT-1A1
AT-1B
AT-1C
AT-1D
Aquifer Tests
Piceance Creek
Redd Ranch
Spring P-L Ranch
Weller Oldland Ranch
Stewart School
Cottonwood Gulch
Stewart Gulch
Willow Creek
Scandard Gulch
Little Scandard
Sorghum
West Fork
Middle
Ditch
Flume
T 2 S
T 3 S
R 97 W
R 96 W
35
36
31
32
33
11
12
8
9
14
13
18
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FIGURE II B-1

TABLE II B-1
Well Summary Table

AQUIFER TEST WELLS

Well No.	Status	Drill Stem & Jet Test Data	Drilling Water Production Data	Drilling Water Quality Analysis	Geophysical Log Data*	Lithological Log Data	Cored Intervals	Assay Data			Core & Cuttings Trace Element Analysis	Rock Mechanics Data	Gas Data		Completion Data	Survey Plat
								Modified Fisher Assay	Al.	Na			Drilling Log	Bomb Sample		
AT-1	Partially Complete	1 Zone (JT)	Complete To 1338'	Complete (1 Sample)	5 - B, L, FD, ND, & T.	Field	No Core Taken	N.A.	N.A	N.A	N.A.	N.A.	N.A.	N.A.	Yes	Yes
AT-1a	Drilling Completed 7/1/74 To 1621' T.D.	4 Zones (JT) 1 Zone (DST)	Complete To 1611'	Complete (4 Samples)	8 - E, V, D, N, C, T', T, (W).	Field	1270' To 1519'	Yes	Yes	Yes		Yes	N.A.	N.A.	Yes	Yes
AT-1a1	Drilling Completed 7/10/74 To 1341' T.D.	1 Zone (JT)	Complete To 1320'	N.A.	N.A.	Field	No Core Taken	N.A.	N.A.	N.A	Inc.	N.A.	N.A.	N.A.	Yes	Yes
AT-1b	Drilling Completed 7/20/74 To 1638' T.D.	4 Zones (JT)	Complete To 1630'	N.A.	6 - B, L, FD, ND, T & (TM).	Field	No Core Taken	N.A.	N.A.	N.A	N.A.	N.A.	N.A.	N.A.	Yes	Yes
AT-1c	Drilling. Completed 8/18/74 To 1640' T.D.	4 Zones (JT) 1 Zone (DST)	Complete To 1640' T.D.	Complete (4 Samples)	Inc. (Returned To Schlumberger For Correction)	Field	No Core Taken	N.A.	N.A.	N.A	N.A.	N.A.	N.A.	2 Depths	Yes	Yes
AT-1d	Drilling Completed 7/28/74 To 1640' T.D.	4 Zones (JT)	Complete To 1640' T.D.	N.A.	6 - B, L, FD, ND, T & (CBL).	Field	No Core Taken	N.A.	N.A.	N.A	N.A.	N.A.	N.A.	N.A.	Yes	Yes
SG-6	Drilling Completed 8/22/74 To 2220' T.D.	5 Zones (JT)	Complete To 2220' T.D.	Complete (5 Samples)	Inc. Returned To Schlumberger For Correction)	Field	1195' To T.D.	Inc.	Inc.	Inc		Inc.	Yes	4 Depths	Yes	Yes

* - Legend for interpretation of notation included in Table II B-14 of geophysical log section of data summary.
Inc. - Data collected but analysis incomplete.
N.A. - Not applicable.

TABLE II B-1
Well Summary Table

AQUIFER TEST WELLS (Continued)

Well No.	Status	Drill Stem & Jet Test Data	Drilling Water Production Data	Drilling Water Quality Analysis	Geophysical Log Data*	Lithological Log Data	Cored Intervals	Assay Data			Core & Cuttings Trace Element Analysis	Rock Mechanics Data	Gas Data		Completion Data	Survey Plat
								Modified Fisher Assay	Al.	Na			Drilling Log	Bomb Sample		
SG-10	Drilling Completed 6/29/74 To 2211' T.D.	4 Zones (JT) 1 Zone (DST)	Complete To 2211' T.D.	Complete (4 Samples)	8 - E, V, D, N, C, T', T, (W).	Field	1200' To T. D.	Yes	Yes	Yes	Inc.	Yes			Yes	Yes
SG-10a	Drilling Completed 7/10/74 To 1333' T.D.	1 Zone (JT)	Complete To 1333' T.D.	N.A.	N.A.	Field	No Core Taken	N.A.	N.A	N.A	N.A.	N.A.	N.A.	N.A.	Yes	Inc.
SG-11	Drilling Completed 9/8/74 To 2826' T.D.	7 Zones (JT)	Complete To 2810'	Complete (6 Samples)	4 - B, L, T, & (CBL).	Field	750' To T.D.	Yes	Inc.	Inc.		Inc.	Yes	6 Depths	Yes	Yes
DEEP COREHOLES AND WELLS																
SG-1	Drilling Completed 12/6/74 To 2525' T.D.	Inc.	Inc.	Inc.	Inc.	Field	550' To 2525' T.D.	Inc.	Inc	Inc		Inc.	Yes	6 Depths	Inc.	Yes
SG-8	Drilling Completed 11/27/74 To 2608' T.D.	5 Zones (JT)	Complete To 2608' T.D.	Inc.	Inc.	Field	580' To T.D.	Inc.	Inc	Inc	Inc.	Inc.	Yes	6 Depths	Inc.	Yes
SG-9	Drilling Completed 10/23/74 To 2750' T.D.	5 Zones (JT)	Complete To 2750' T.D.	Complete (5 Samples)	Inc. (Returned To Schlumberger For Correction)	Field	1200' To T.D.	Inc.	Inc.	Inc		Inc.	Yes	8 Depths	Yes	Yes

* - Legend for interpretation of notation included in Table II B-14 of geophysical log section of data summary.

Inc. - Data collected but analysis incomplete.

N.A. - Not applicable.

TABLE II B-1
Well Summary Table

DEEP COREHOLES AND WELLS (Continued)

Well No.	Status	Drill Stem & Jet Test Data	Drilling Water Production Data	Drilling Water Quality Analysis	Geophysical Log Data*	Lithological Log Data	Cored Intervals	Assay Data			Core & Cuttings Trace Element Analysis	Rock Mechanics Data	Gas Data		Completion Data	Survey Plat
								Modified Fisher Assay	Al.	Na			Drilling Log	Bomb Sample		
SG-17	Drilling in Progress	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.		Inc.	N.A.	9 Depths	Inc.	Yes
SG-18	Drilled & Abandoned 10/13/74 At 1426' T.D.	2 Zones (JT)	Complete To 1426' T.D.	Complete (3 Samples)	4 - B, L, FD, & T.	Field	1380' To T.D.	Yes	Inc.	Inc.		Inc.	Yes	1 Depth	Yes	Yes
SG-18a	Drilling Completed 10/18/74 To 1330' T.D.	1 Zone (JT)	Complete To 1330' T.D.	Complete (1 Sample)	N.A.	Field	No Core Taken	N.A.	N.A	N.A.	N.A.	N.A.	Yes	1 Depth	Yes	Inc
SG-19	Drilling Completed 9/28/74 To 980' T.D.	3 Zones (JT)	Complete To 980' T.D.	Complete (4 Samples)	4 - B, L, FD, & T.	Field	9301' To T.D.	Yes	Inc.	Inc.		Inc.	Yes	4 Depths	Yes	Yes
SG-20	Drilling in Progress	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.		Inc.	Inc.	Inc.	Inc.	Yes
SG-21	Drilling in Progress	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.	Inc.		Inc.	Inc.	Inc.	Inc.	Yes
Cb-1	Existing Open Corehole To 2103' T.D.	N.A.	N.A.	N.A.	1 - T'	N.A.	N.A.	N.A.	N.A	N.A	N.A.	N.A.	N.A.	N.A.	Yes	Yes
Cb-2	Existing Open Corehole To 1469 T.D.	N.A.	N.A.	N.A.	2 - T' & (CBL).	N.A.	N.A.	N.A.	N.A.	N.A	N.A.	N.A.	N.A.	N.A.	Yes	Yes

* - Legend for interpretation of notation included in Table II B-14 of geophysical log section of data summary.

Inc. - Data collected but analysis incomplete.

N.A. - Not applicable.

TABLE II B-1
Well Summary Table

DEEP COREHOLES AND WELLS (Continued)

Well No.	Status	Drill Stem & Jet Test Data	Drilling Water Production Data	Drilling Water Quality Analysis	Geophysical Log Data*	Lithological Log Data	Cored Intervals	Assay Data			Core & Cuttings Trace Element Analysis	Rock Mechanics Data	Gas Data		Completion Data	Survey Plat
								Modified Fisher Assay	Al.	Na			Drilling Log	Bomb Sample		
Cb-2b	Drilled & Abandoned 9/20/74 At 1220' T.D.	1 Zone (JT)	Complete To 1220' T.D.	Inc.	N.A.	Field	No Core Taken	N.A.	N.A	N.A		N.A.	Yes	1 Depth	Yes	Inc.
Cb-3	Existing Open Corehole	N.A.	N.A.	N.A.	1 - T'	N.A.	N.A.	N.A.	N.A.	N.A	N.A.	N.A.	N.A.	N.A.	N.A.	Yes
Cb-4	Existing Open Corehole To 1470'T.D.	N.A.	N.A.	N.A.	2 - T' & (CBL).	N.A.	N.A.	N.A.	N.A.	N.A	N.A.	N.A.	N.A.	N.A.	N.A.	Yes
ALLUVIAL WELLS																
A-1	Drilling Completed 10/2/74 To 109' T.D.	N.A.	N.A.	Complete	N.A.	Field	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Yes	Yes
A-2	Drilling Completed 10/4/74 To 82'T.D.	"	"	Complete	"	Field	"	"	"	"	"	"	"	"	Yes	Yes
A-3	Drilling Completed 10/7/74 To 112'T.D.	"	"	Complete	"	Field	"	"	"	"	"	"	"	"	Yes	Yes
A-4	Drilling Completed 10/8/74 To 64'T.D.	"	"	N.A. (Dry Hole)	"	Field	"	"	"	"	"	"	"	"	Yes	Yes

* - Legend for interpretation of notation included in Table II B-14 of geophysical log section of data summary.

Inc. - Data collected but analysis incomplete.

N.A. - Not applicable.

TABLE II B-1
Well Summary Table

ALLUVIAL WELLS (Continued)

Well No.	Status	Drill Stem & Jet Test Data	Drilling Water Production Data	Drilling Water Quality Analysis	Geophysical Log Data*	Lithological Log Data	Cored Intervals	Assay Data			Core & Cuttings Trace Element Analysis	Rock Mechanics Data	Gas Data		Completion Data	Survey Plat
								Modified Fisher Assay	Al.	Na			Drilling Log	Bomb Sample		
A-5	Drilling Completed 10/3/74 To 86'T.D.	N.A.	N.A.	Complete	N.A.	Field	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Yes	Yes
A-6	Drilling Completed 10/10/74 To 60' T.D.	"	"	Complete	"	Field	"	"	"	"	"	"	"	"	Yes	Yes
A-7	Drilling Completed 9/28/74 To 51'T.D.	"	"	Complete	"	Inc.	"	"	"	"	"	"	"	"	Yes	Yes
A-8	Drilling Completed 10/1/74 To 70'T.D.	"	"	Complete	"	Field	"	"	"	"	"	"	"	"	Yes	Yes
A-9	Drilling Completed 9/23/74 To 57'T.D.	"	"	Complete	"	Field	"	"	"	"	"	"	"	"	Yes	Yes
A-10	Drilling Completed 9/23/74 To 67'T.D.	"	"	Complete	"	Field	"	"	"	"	"	"	"	"	Yes	Yes
A-11	Drilling Completed 9/24/74 To 66'T.D.	"	"	Complete	"	Field	"	"	"	"	"	"	"	"	Yes	Yes

* - Legend for interpretation of notation included in Table II B-14 of geophysical log section of data summary.

Inc. - Data collected but analysis incomplete.

N.A. - Not applicable.

TABLE II B-1
Well Summary Table

ALLUVIAL WELLS (Continued)

Well No.	Status	Drill Stem & Jet Test Data	Drilling Water Production Data	Drilling Water Quality Analysis	Geophysical Log Data*	Lithological Log Data	Cored Intervals	Assay Data			Core & Cuttings Trace Element Analysis	Rock Mechanics Data	Gas Data		Completion Data	Survey Plat
								Modified Fisher Assay	Al.	Na			Drilling Log	Bomb Sample		
A-12	Drilling Completed 9/24/74 To 81'T.D.	N.A.	N.A.	Complete	N.A.	Field	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Yes	Yes
A-13	Drilling Completed 10/8/74 To 14'T.D.	N.A.	N.A.	N.A. (Dry Hole)	N.A.	Field	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	Yes	Yes

* - Legend for interpretation of notation included in Table II B-14 of geophysical log section of data summary.
Inc. - Data collected but analysis incomplete.
N.A. - Not applicable.

Section II

Core Drilling and Associated Ground Water

Included in this section is all the data compiled as of November 30, 1974, as part of the Core Drilling and Associated Ground Water Program which commenced with the drilling of the deep corehole SG-10 on June 6, 1974.

Much of the data presented is in supplement to that actually required by the Oil Shale Lease Environmental Stipulations. As defined by the Lease, three observation wells are required for each spent shale disposal site, one upgradient and two downgradient. Each of these wells (SG-18, SG-19, A-7) is to be monitored for water level, water temperature, and water quality.

In addition to the above wells, a test well (AT-1) and an observation well (AT-1c) in each water-bearing zone defined by the test well are required at each proposed mine site. Samples of drill cuttings and borehole geophysical logs are required for each of the two wells as directed by the Mining Supervisor.

It is also stipulated that each water-bearing zone penetrated by the test well be pumped maintaining steady and continuous discharge for a period of time determined by the Mining Supervisor. During such a pump test the following data should be recorded:

1. Water-level fluctuations in the observation well.
2. Water discharge volume from the test well.
3. Water quality of the test well.

After the pump test, records of water level and temperature must then be maintained on the test well and observation well pursuant to a measurement schedule.

After all initial tests, water samples from each well shall be collected at six-month intervals and analyzed for evidence of trends in water quality as determined by comparing the samples with previous analyses.

The pump test as described above was not commenced until November 28, 1974. Therefore, no results from the test were available for inclusion in this report. Also, no six-month water samples have been collected to date.

Only the five wells mentioned above are specifically required by the Lease. The remainder of the data presented in the section, while not specifically required by the Lease, is essential in further planning and evaluation of the complexity of problems confronting the mining operation and has been collected for that

Core Drilling and Associated Ground Water
(Continued)

purpose. Instead of simply abandoning these "extra" (beyond the minimal requirements of the Lease) holes after the mining information is obtained from them, we have completed them as additional ground water monitoring holes to supplement our baseline data.

SECTION II

CORE DRILLING AND ASSOCIATED GROUND WATER

DESCRIPTION OF CONTENTS

Table/Figure No.	Title/Description	Page No.
Fig. II B-1	Well Location - a map of all wells and deep core holes completed, in progress, or proposed on or adjacent to Tract C-b.	II B-6
Table II B-1	Well Summary Table - a summary by well of all the information compiled for each well as of November 30, 1974. Each of the table headings serves as a subsection in the remainder of the section.	II B-7 through II B-12
Table II B-2	Survey Plats - both an introduction to the actual survey plants it precedes and a summary of those plats completed.	II B-13 through II B-43
Table II B-3	Well Completion Data - both an introduction to the actual completion data it precedes and a summary of that completion data available.	II B-44 through II B-76
------------	Jetting Test Data - a brief description of test methodology followed by:	II B-77
Table II B-4	+ Calculated Transmissivity Values - a tabulation by wells of those values determined from jetting and drill stem test data,	II B-78
Fig. II B-2	+ Example of Transmissivity Value Calculation, and	II B-79
------------	+ Jetting Tests Raw Data - a presentation of all field data from which transmissivity values have been calculated.	II B-80 through II B-131
------------	Drilling Water Production - a brief description of data collected followed by:	II B-132
Figs. II B-3 through II B-17	+ Water Production, Temperature, and Conductivity During Drilling - graphs of the water parameters vs. well depth, and	II B-133 through II B-146

Table/Figure No.	Title/Description	Page No.
------------	+ Water Production and Conductivity Data Sheets - copies of the raw water production data by well.	II B-147 through II B-190
------------	Drilling Water Quality - a brief description of the drilling water analytical program followed by:	II B-191
Tables II B-5 thru II B-14	+ Water Quality Analytical Program Summary Tables - a tabulation of data compiled from the laboratory data sheets, and	II B-192 through II B-201
-------------	+ Water Quality Laboratory Data Sheets, the actual laboratory data sheets resulting from water analysis.	II B-202 through II B-357
-------------	Baseline Water Quality - an introduction to the Baseline Water Quality Program followed by:	II B-358
Table II B-15	+ Baseline Water Quality Analysis Table - a tabulation by well of water quality data.	II B-359
-------------	Geophysical Logs - a brief description of the geophysical log program followed by:	II B-360
Table II B-16	+ Geophysical Log Summary Table - a tabulation by well of those logs run including an explanation of notation used in Table II B-1, and	II B-361
-------------	+ Geophysical Logs - copies of the actual logs run.	II B-362 through II B-373
-------------	Lithological Logs - an introduction to the lithological log program followed by actual field copies of all logs completed.	II B-374 through II-B-378
-------------	Core Assay Data - an introduction to the core assay program including a description of methodology followed by presentation of the data.	II B-379 through II B-441
-------------	Trace Element Analysis From Core and Cuttings - a description of the program requirements.	II B-442

Table/Figure No.	Title/Description	Page No.
--------------	Rock Mechanics - a description of the rock mehcanics program followed :	II B-443
--------------	+ Addendum to July Monthly Report, Geotechnical Study by Golder Associates.	II B-444 through II B-490
--------------	Gas Determination and Analysis - a discussion of the current program followed by:	II B-491
Table II B-17	+ Analysis of Gas Samples Summary Table a tabulation by well of all gas analyses results. Gas samples were collected from the blooie line on the drilling rig, using evacuated steel containers. Gas analysis was done by The Oil Shale Corporation Laboratory, Golden, Colorado, utilizing gas chromatography with flame ionization and thermal conductivity detectors.	II B-492
Figs. II B-18 through II B-27	+ Baroid Gas Detector Charts - Baroid mud loggers, located on all drilling rigs, measure the relative amount of methane in the gas stream from the blooie lines. This data is plotted against depth on charts. The Baroid Analyzers report in uncalibrated units; we are currently attempting to establish a correlation between these units and the bomb sample results. (Even though we regard the gas data collected to date as qualitative in nature.)	II B-493 through II B-508

Well Survey Plats

TABLE II B-2

Survey Plats

The following is a list of those wells on which survey plats have been completed. A copy of each of the survey plats follows in this section.

Aquifer Test Wells
- AT-1 (pump test well)
- AT-1a
- AT-1a1
- AT-1b
- AT-1c
- AT-1d

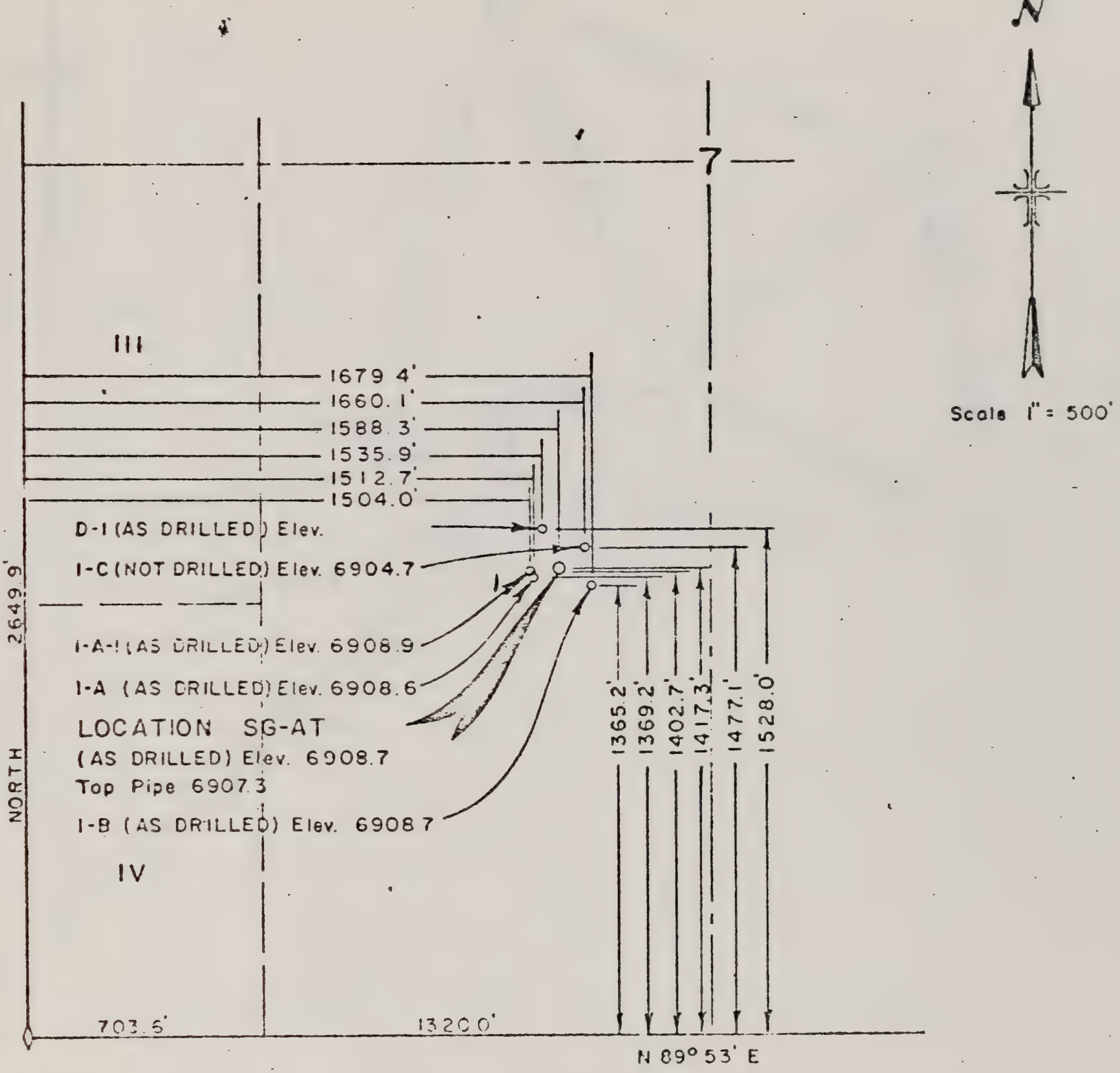
Alluvial Wells
- A-1
- A-2
- A-3
- A-4
- A-5
- A-6
- A-7
- A-8
- A-9
- A-10
- A-11
- A-12
- A-13

Deep Coreholes and Wells
- SG-1
- *SG-6
- SG-8
- SG-9
- *SG-10
- *SG-11
- SG-17
- SG-18
- SG-19
- SG-20
- SG-21

Existing Open Coreholes
- Cb-1
- Cb-2
- Cb-3
- Cb-4

* Also used as outer observation wells for Aquifer pump tests.

CORE HOLE LOCATIONS
SW¼ SECTION 7
T 3S, R 96 W, 6TH PM.


N
Scale 1" = 500'
7
III
IV
1679.4'
1660.1'
1588.3'
1535.9'
1512.7'
1504.0'
D-1 (AS DRILLED) Elev.
1-C (NOT DRILLED) Elev. 6904.7
1-A-1 (AS DRILLED) Elev. 6908.9
1-A (AS DRILLED) Elev. 6908.6
LOCATION SG-AT
(AS DRILLED) Elev. 6908.7
Top Pipe 6907.3
1-B (AS DRILLED) Elev. 6908.7
NORTH 2649.9'
1365.2'
1369.2'
1402.7'
1417.3'
1477.1'
1528.0'
703.5'
1320.0'
N 89° 53' E

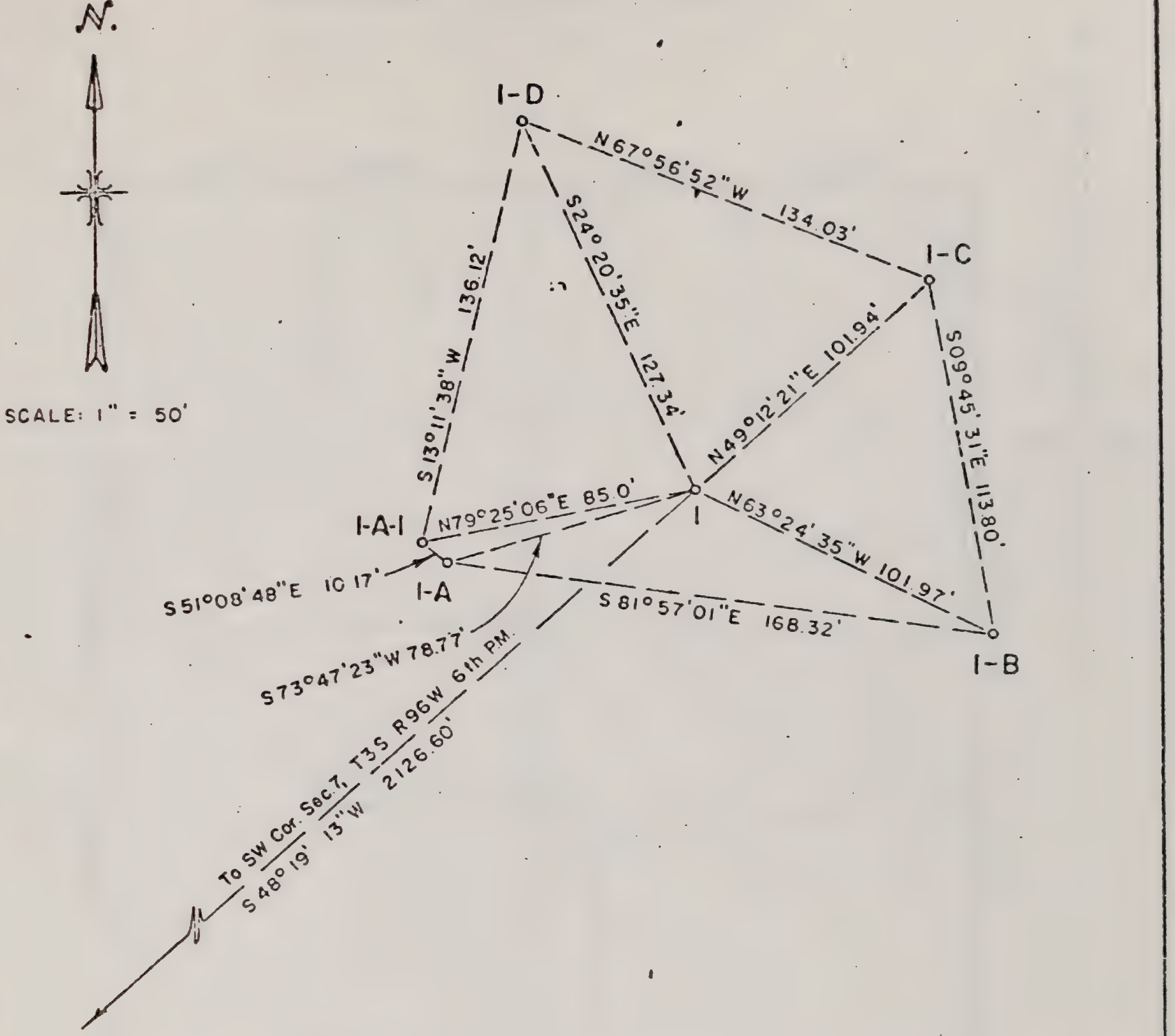
NOTE – Elevations referred to U.S.G.S. Datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 29, 1974.

Clarence J. Bielak
Registered Land Surveyor

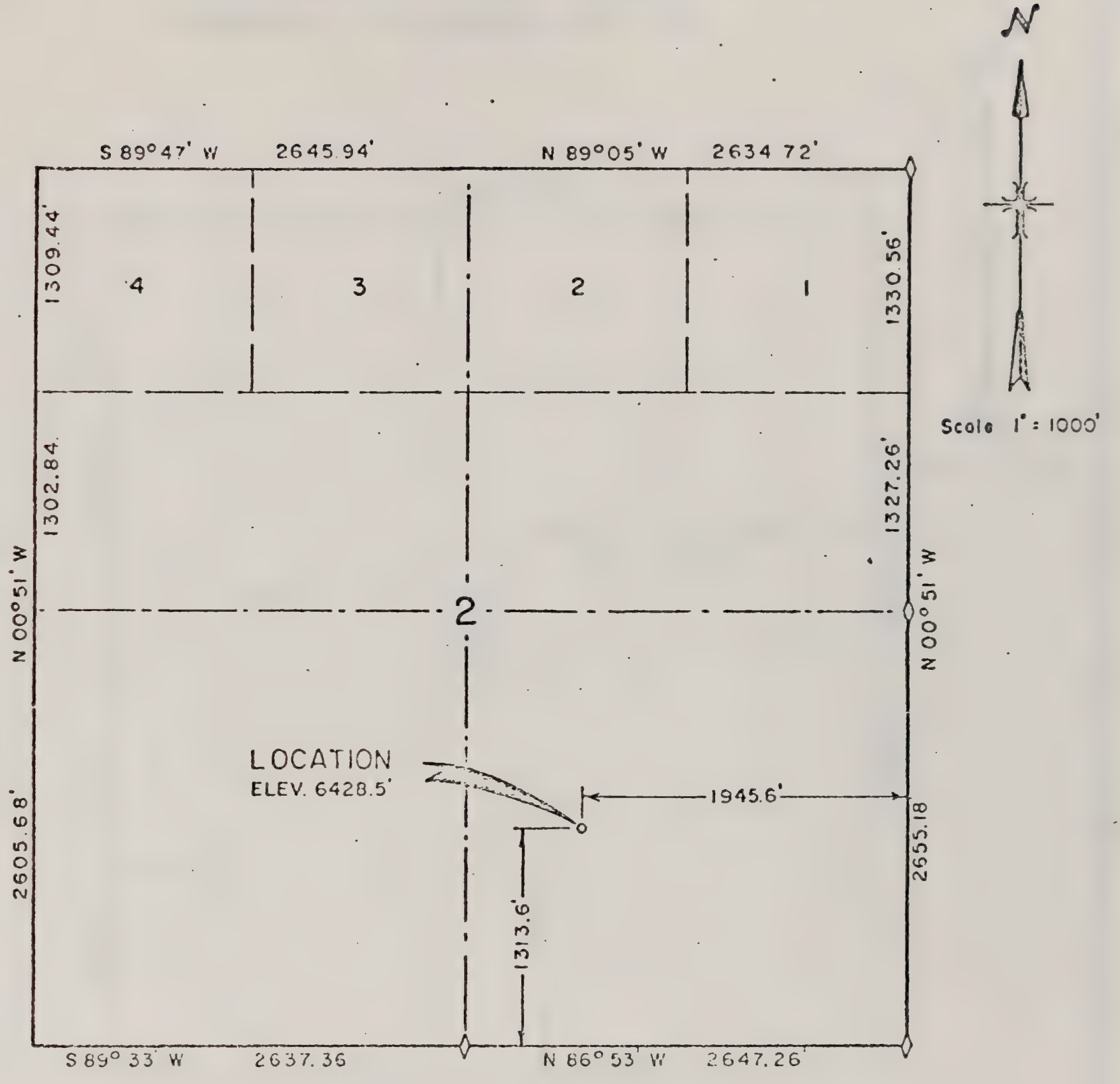
REVISED 7/29/74

WESTERN ENGINEERS, INC.
CORE HOLE LOCATIONS
ATLANTIC RICHFIELD COMPANY
SG–AT LOCATIONS
RIO BLANCO COUNTY, COL
SURVEYED C.J.B. DRAWN [illegible]
GRAND JUNCTION, COLO [illegible]


N.
SCALE: 1" = 50'
I-D
I-C
I
I-A-I
I-A
I-B
N67°56'52"W 134.03'
S13°11'38"W 136.12'
S24°20'35"E 127.34'
N49°12'21"E 101.94'
S09°45'31"E 113.80'
N79°25'06"E 85.0'
N63°24'35"W 101.97'
S51°08'48"E 10.17'
S81°57'01"E 168.32'
S73°47'23"W 78.77'
To SW Cor. Sec.7, T3S R96W 6th P.M.
S48°19'13"W 2126.60'

WESTERN ENGINEERS INC
CORE HOLE LOCATIONS
ATLANTIC RICHFIELD COMPANY
I, I-A, I-A-I, I-B, I-C, & I-D
RIO BLANCO COUNTY, COLORADO
SURVEYED [illegible] DRAWN [illegible]
GRAND JCT, COLO [illegible]

CORE HOLE LOCATION
1313.6 FT. N.S.L. — 1945.6 FT W.E.L.
SECTION 2, T 3 S, R 97 W, 6TH P.M.


N
Scale 1" = 1000'
S 89°47' W 2645.94'
N 89°05' W 2634.72'
1309.44'
1302.84'
2605.68'
N 00°51' W
1330.56'
1327.26'
2655.18
N 00°51' W
4
3
2
1
2
LOCATION
ELEV. 6428.5'
1945.6'
1313.6'
S 89° 33' W 2637.36
N 86° 53' W 2647.26

NOTE – Elevation referred to U.S.G.S. Datum

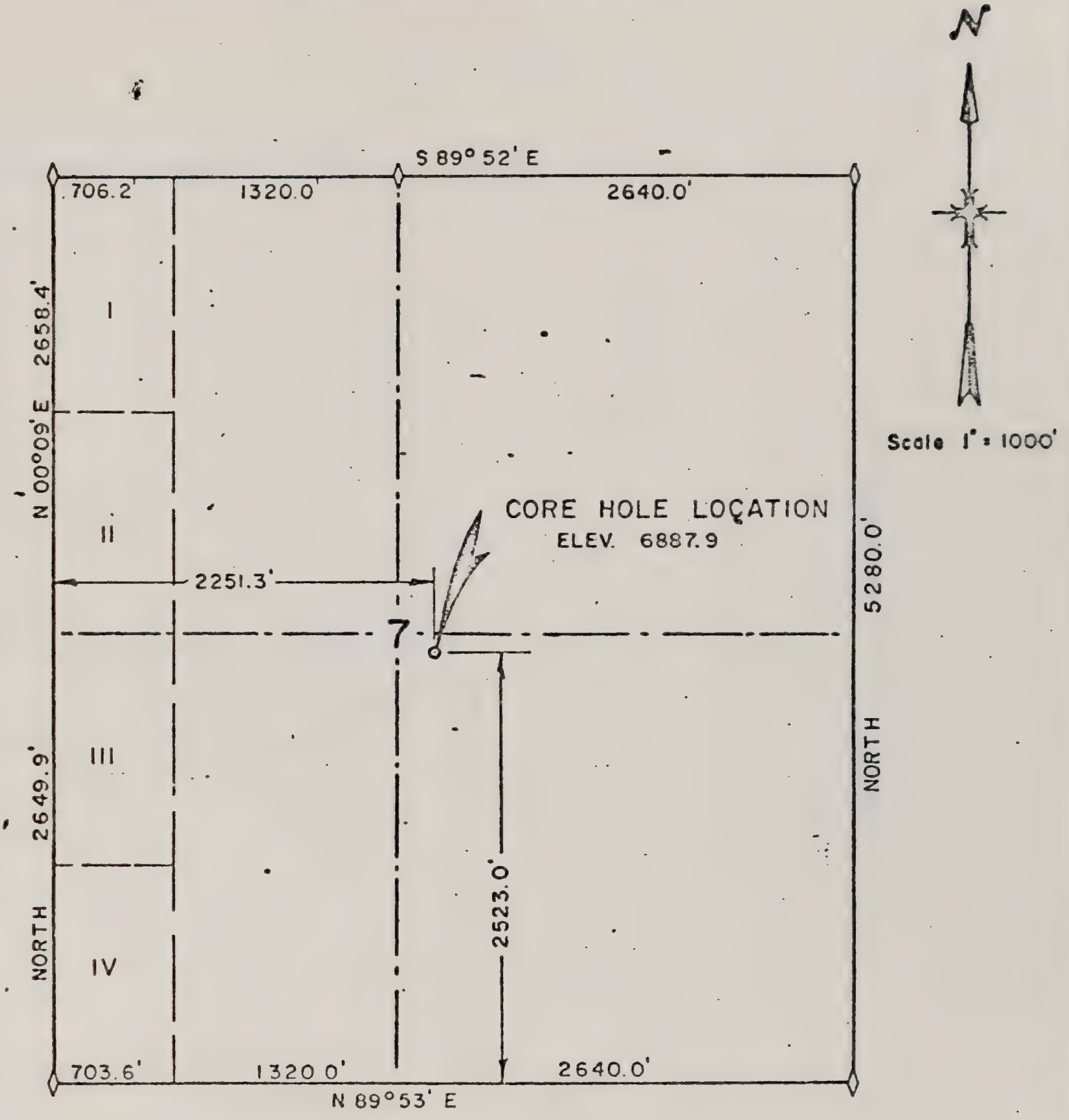
I, David L. Bear do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Apr. 4, 19 74.

Registered Land Surveyor

REVISED 6/10/74

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD COMPANY
SG – 1
RIO BLANCO COUNTY COLORADO
SURVEYED D.L.B. DRAWN K.W.C.
GRAND JUNCTION, COLO. 4/74

CORE HOLE LOCATION
25230FT. N.S.L.—2251.3 FT. E.W.L.
SECTION 7, T 3 S, R 96 W, 6TH P.M.


N
Scale 1" = 1000'
S 89° 52' E
706.2'
1320.0'
2640.0'
N 00°09' E 2658.4'
I
II
III
IV
2649.9'
NORTH
CORE HOLE LOCATION
ELEV. 6887.9
2251.3'
7
2523.0'
5280.0'
NORTH
703.6'
1320.0'
2640.0'
N 89°53' E

NOTE – Elevation referred to U.S.G.S. Datum.

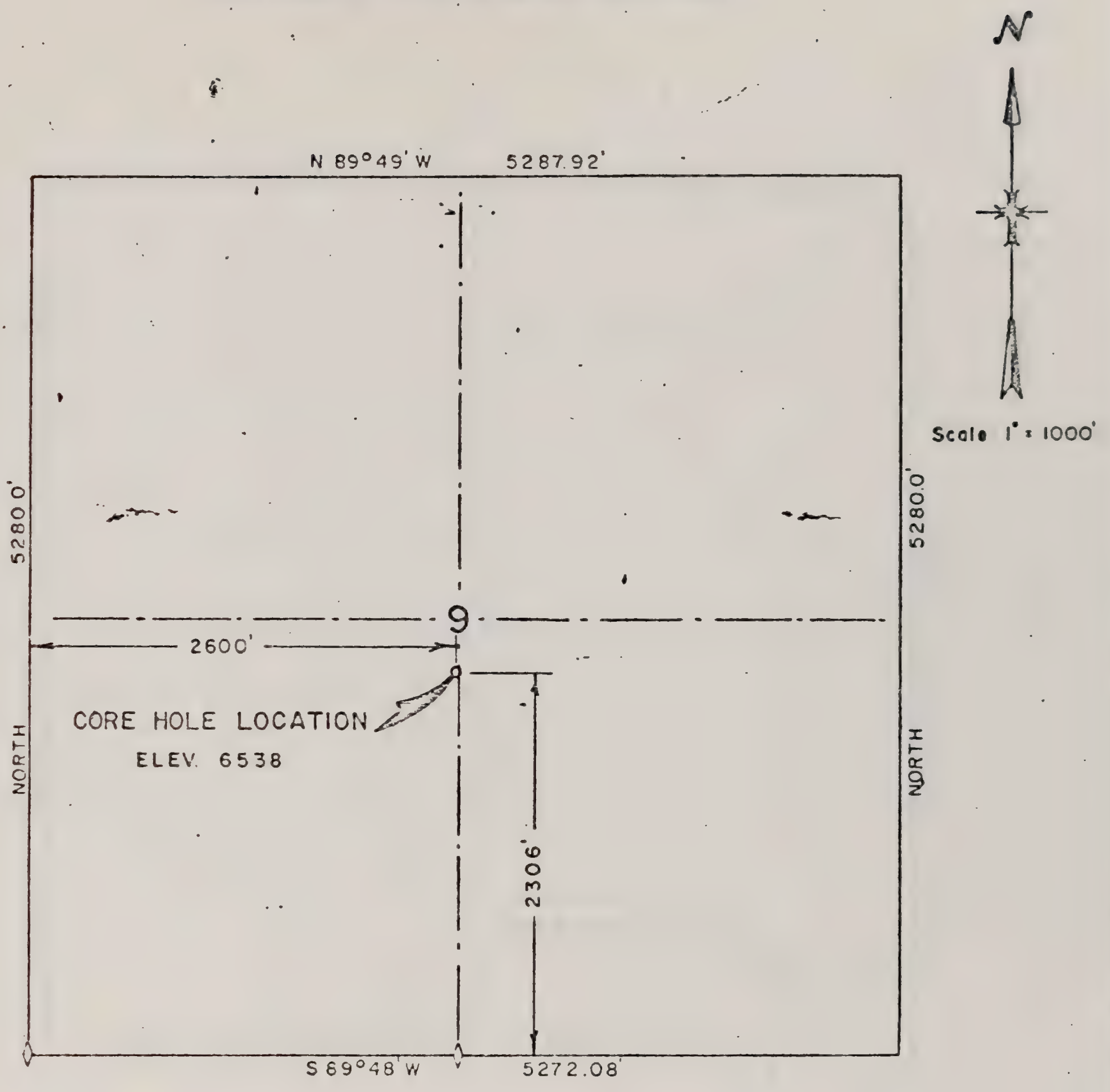
I, Clarence J Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Apr. 3, 1974.

Clarence J. Bielak
Registered Land Surveyor

REVISED 7/29/74
REVISED 6/10/74

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD COMPANY
SG–6
RIO BLANCO COUNTY, COLORADO
SURVEYED [illegible]
GRAND JUNCTION, COLO.

CORE HOLE LOCATION
2306.0FT. N.S.L. — 2600.0FT. E.W.L.
SECTION 9, T 3 S, R 96 W, 6TH P M


N
N 89°49' W
5287.92'
Scale 1" = 1000'
5280.0'
5280.0'
9
2600'
CORE HOLE LOCATION
ELEV. 6538
NORTH
NORTH
2306'
S 89°48' W
5272.08'

NOTE — Elevation referred to U S G S Datum

I, David L Bear do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Apr. 3, 1974.

Registered Land Surveyor

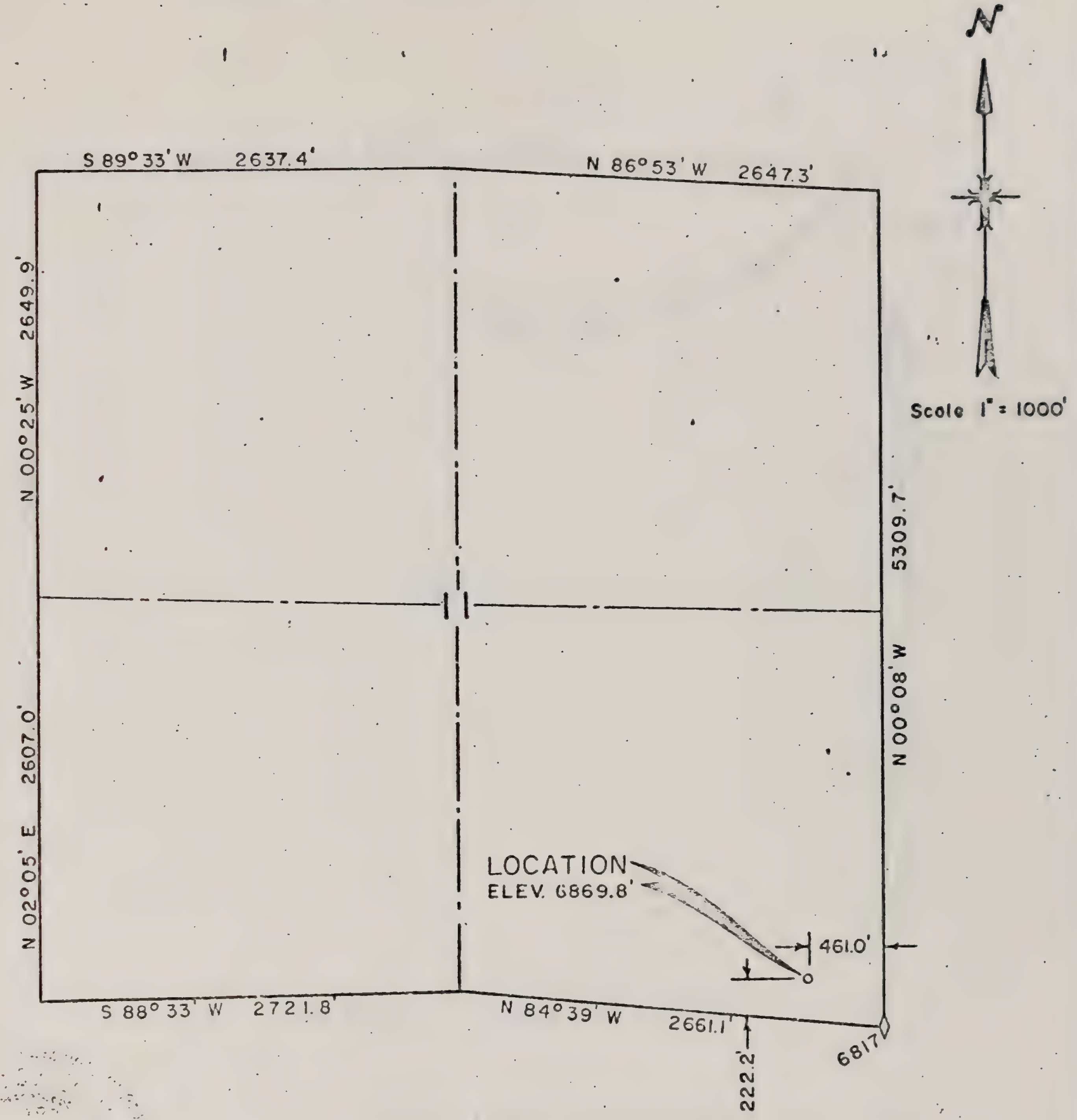
WESTERN ENGINEERS, INC
CORE HOLE LOCATION
ATLANTIC RICHFIELD COMPANY
SG — 8
RIO BLANCO COUNTY, COLORADO
SURVEYED D. L. B. DRAWN [illegible]
GRAND JUNCTION, COLO.

REVISED 7/31/74

CORE HOLE LOCATION

222.2FT. N.S.L. — 461.0FT. W.E.L.

SECTION 11, T 3 S, R 97 W, 6TH P.M.


N
Scale 1" = 1000'
S 89°33' W 2637.4'
N 86°53' W 2647.3'
N 00°25' W 2649.9'
N 02°05' E 2607.0'
5309.7'
N 00°08' W
LOCATION
ELEV. 6869.8'
461.0'
S 88°33' W 2721.8'
N 84°39' W 2661.1'
222.2'
6817

NOTE - Elevation referred to U.S.G.S. Datum

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Apr. 5, 1974.

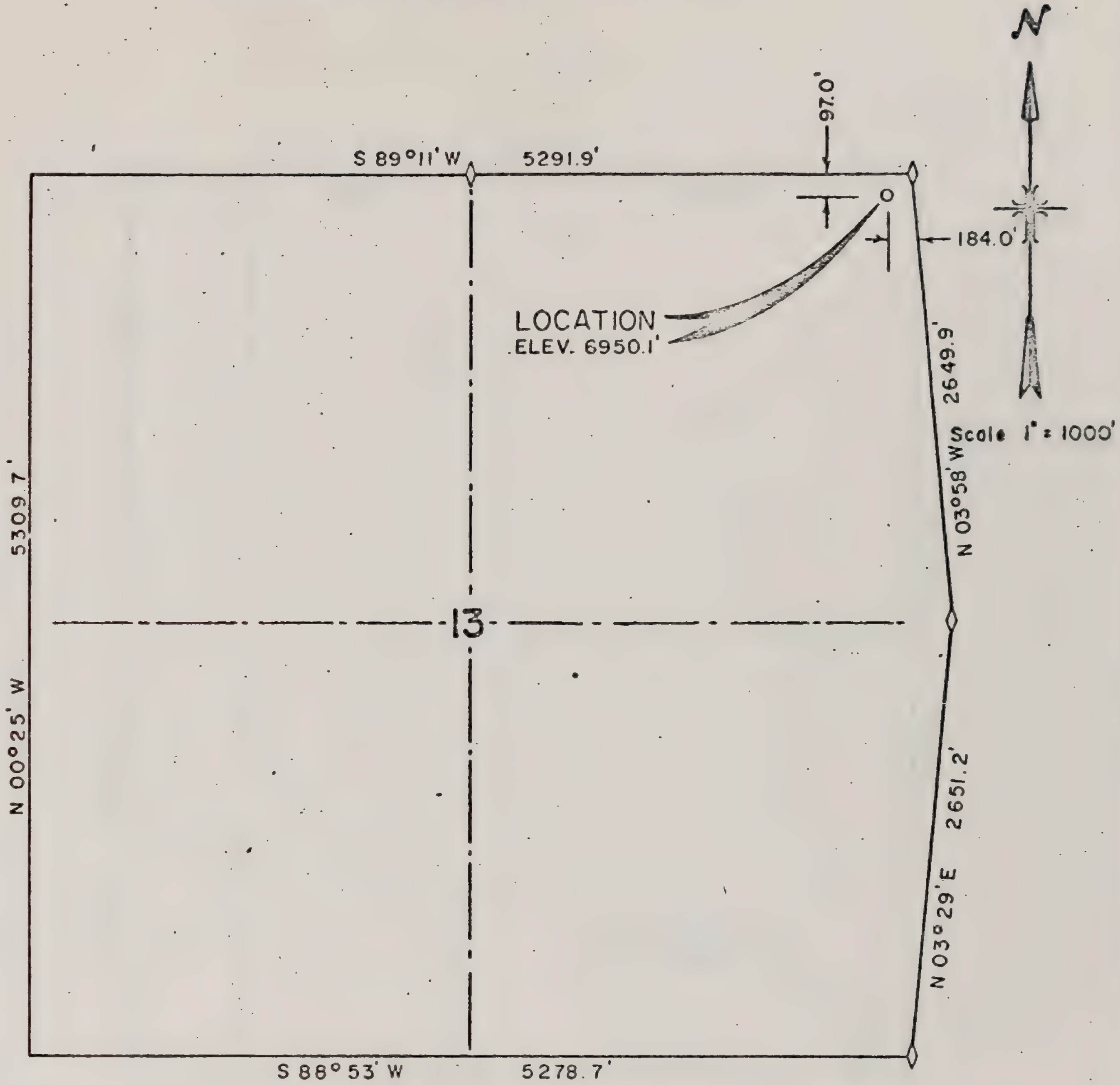
Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD COMPANY
SG-9
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN R.W.O.
GRAND JUNCTION, COLO. 4/[illegible]

II B-18

CORE HOLE LOCATION

97.0FT. S.N.L. — 184.0FT. W.E.L.
SECTION 13, T 3 S, R 97 W, 6TH P.M.



N
97.0'
S 89°11' W
5291.9'
184.0'
LOCATION
ELEV. 6950.1'
2649.9'
N 03°58' W
Scale 1" = 1000'
5309.7'
N 00°25' W
13
2651.2'
N 03°29' E
S 88° 53' W
5278.7'

NOTE – Elevation referred to U.S.G.S. Datum.

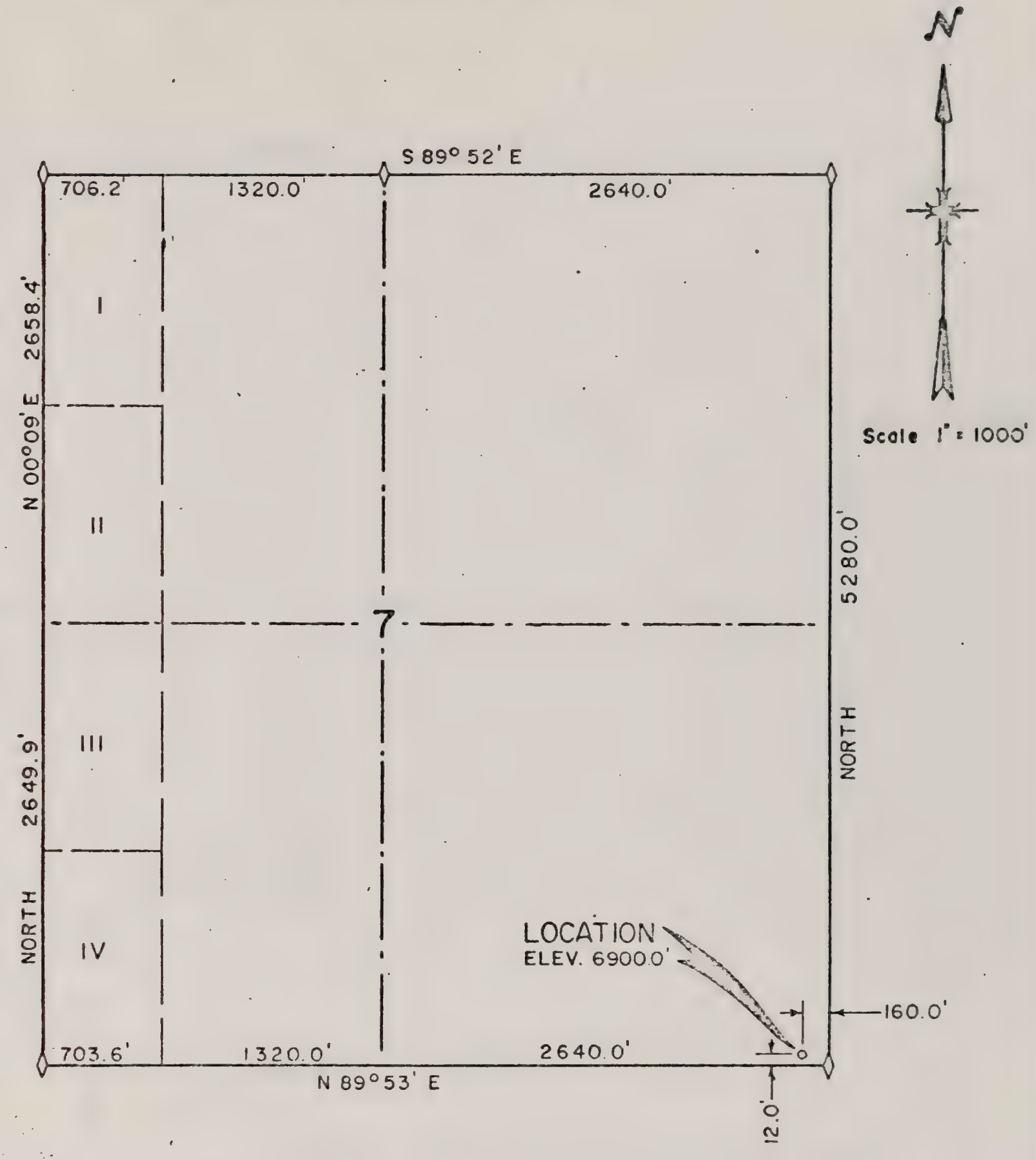
I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Apr. 2, 19 74.

Clarence J. Bielak
Registered Land Surveyor

II B-19

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD COMPANY
SG – 10
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN R.W.O.
GRAND JUNCTION, COLO. 4/[illegible]/7[illegible]

CORE HOLE LOCATION
12.0FT. N.S.L. — 160.0FT. W.E.L.
SECTION 7, T 3 S, R 96 W, 6TH P.M.



N
S 89° 52' E
706.2'
1320.0'
2640.0'
N 00°09' E 2658.4'
I
II
III
IV
7
NORTH 2649.9'
5280.0' NORTH
Scale 1" = 1000'
LOCATION
ELEV. 6900.0'
160.0'
703.6'
1320.0'
2640.0'
N 89° 53' E
12.0'

NOTE — Elevation referred to U.S.G.S. Datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Apr. 3, 19 74.

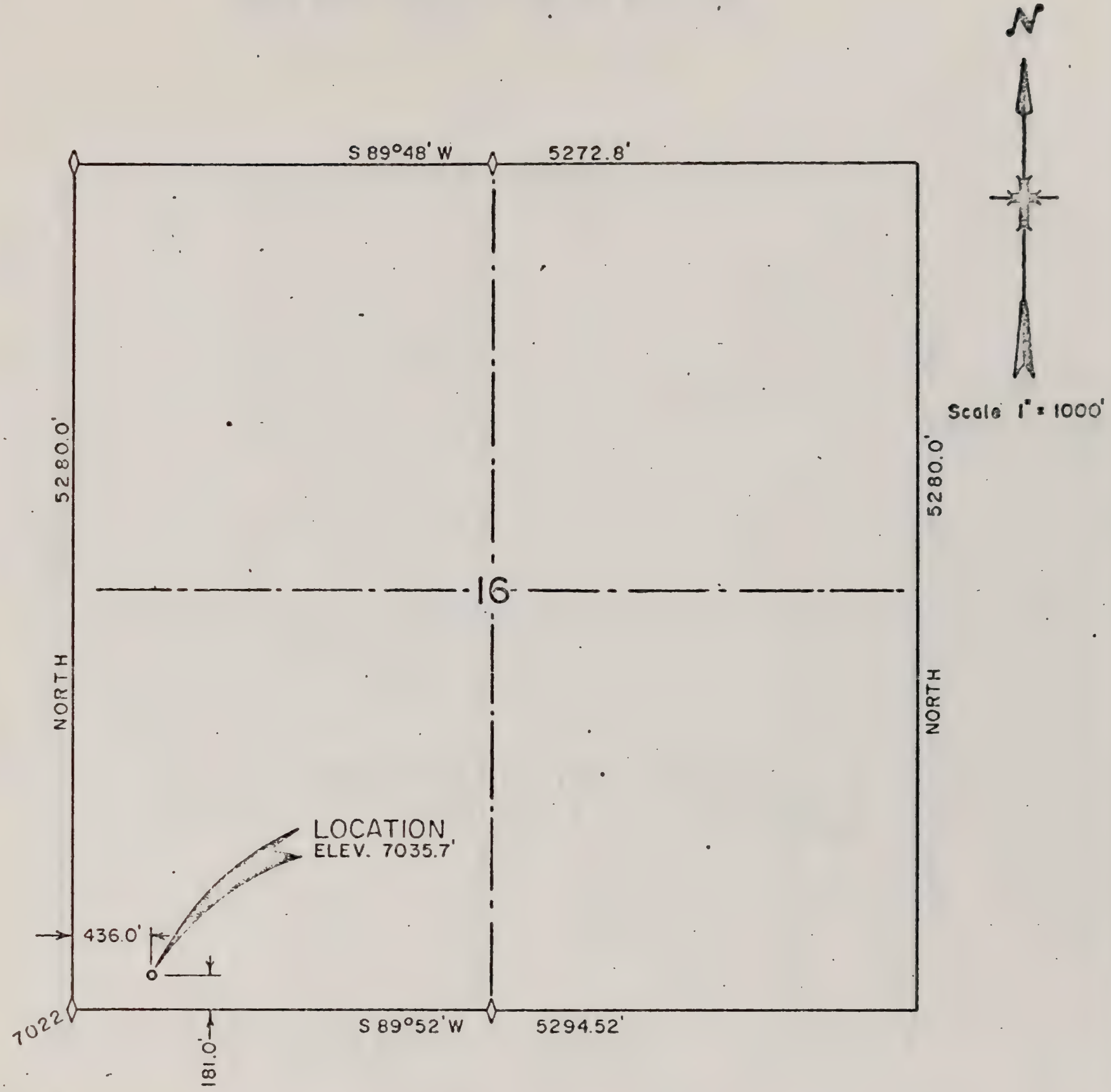
Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD COMPANY
SG-11
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN R.W.O.
GRAND JUNCTION, COLO. [illegible]

CORE HOLE LOCATION

436.0 FT. N.S.L. — 181.0 FT. E.W.L.

SECTION 16, T 3 S, R 96 W, 6TH P.M.


N
Scale 1" = 1000'
S 89°48' W
5272.8'
5280.0'
NORTH
5280.0'
NORTH
16
LOCATION
ELEV. 7035.7'
436.0'
7022
S 89°52' W
5294.52'
181.0'

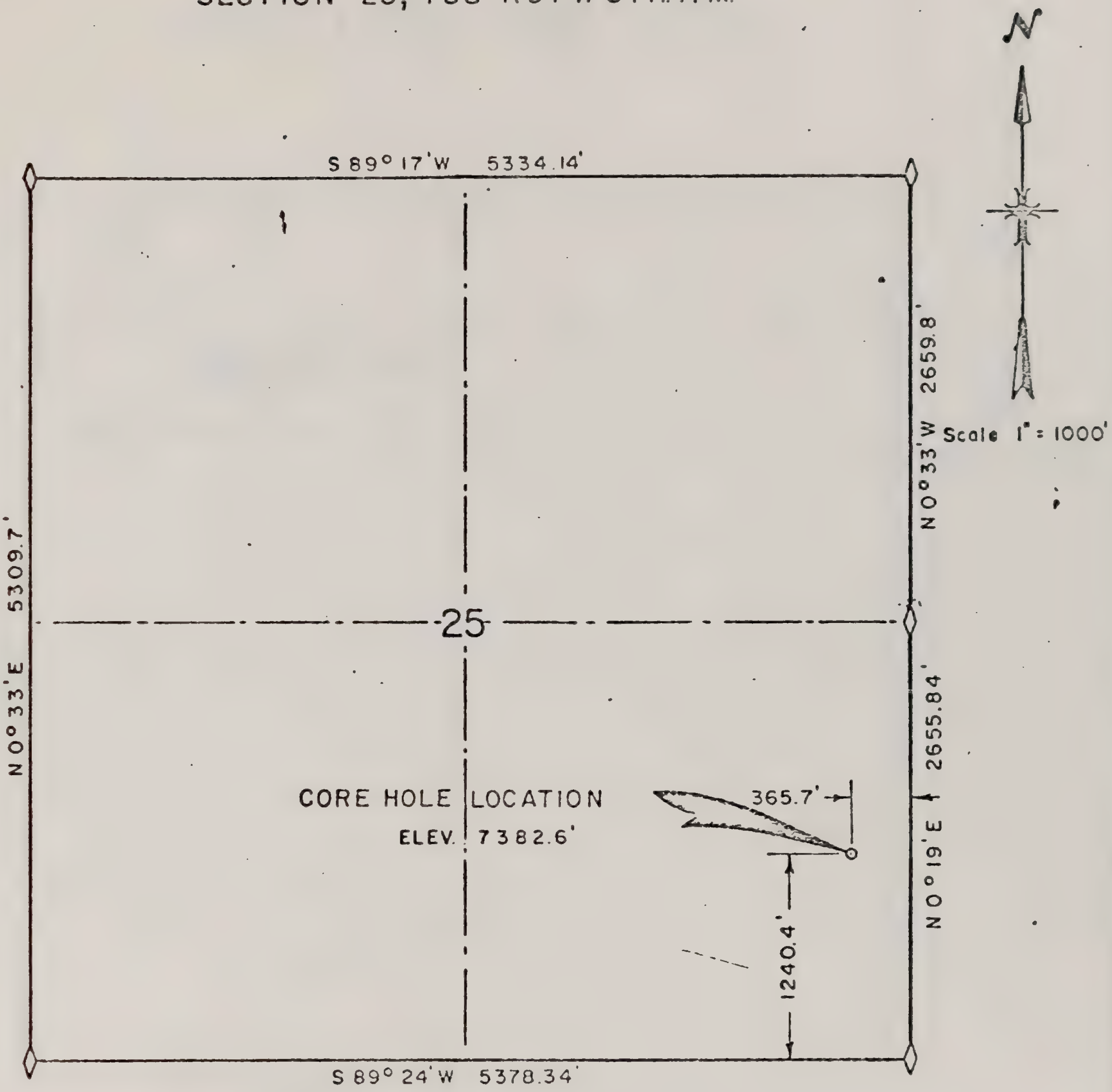
NOTE – Elevation referred to U.S.G.S. Datum

I, David L. Bear do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Apr. 3, 1974.

David L. Bear
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD COMPANY
SG--17
RIO BLANCO COUNTY, COLORADO
SURVEYED D.L.B. DRAWN L.W.C.
[illegible] JUNCTION, C [illegible]

CORE HOLE LOCATION
1240.4 FT. N.S.L. -365.7 FT. W.E.L.
SECTION 25, T3S R97W 6TH. P.M.


N
Scale 1" = 1000'
S 89° 17' W 5334.14'
N 0° 33' E 5309.7'
N 0° 33' W 2659.8'
N 0° 19' E 2655.84'
25
CORE HOLE LOCATION
ELEV. 7382.6'
365.7'
1240.4'
S 89° 24' W 5378.34'

NOTE: Elevation referred to U.S.G.S. datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 29, 1974.

Clarence J. Bielak
Registered Land Surveyor

II B-22

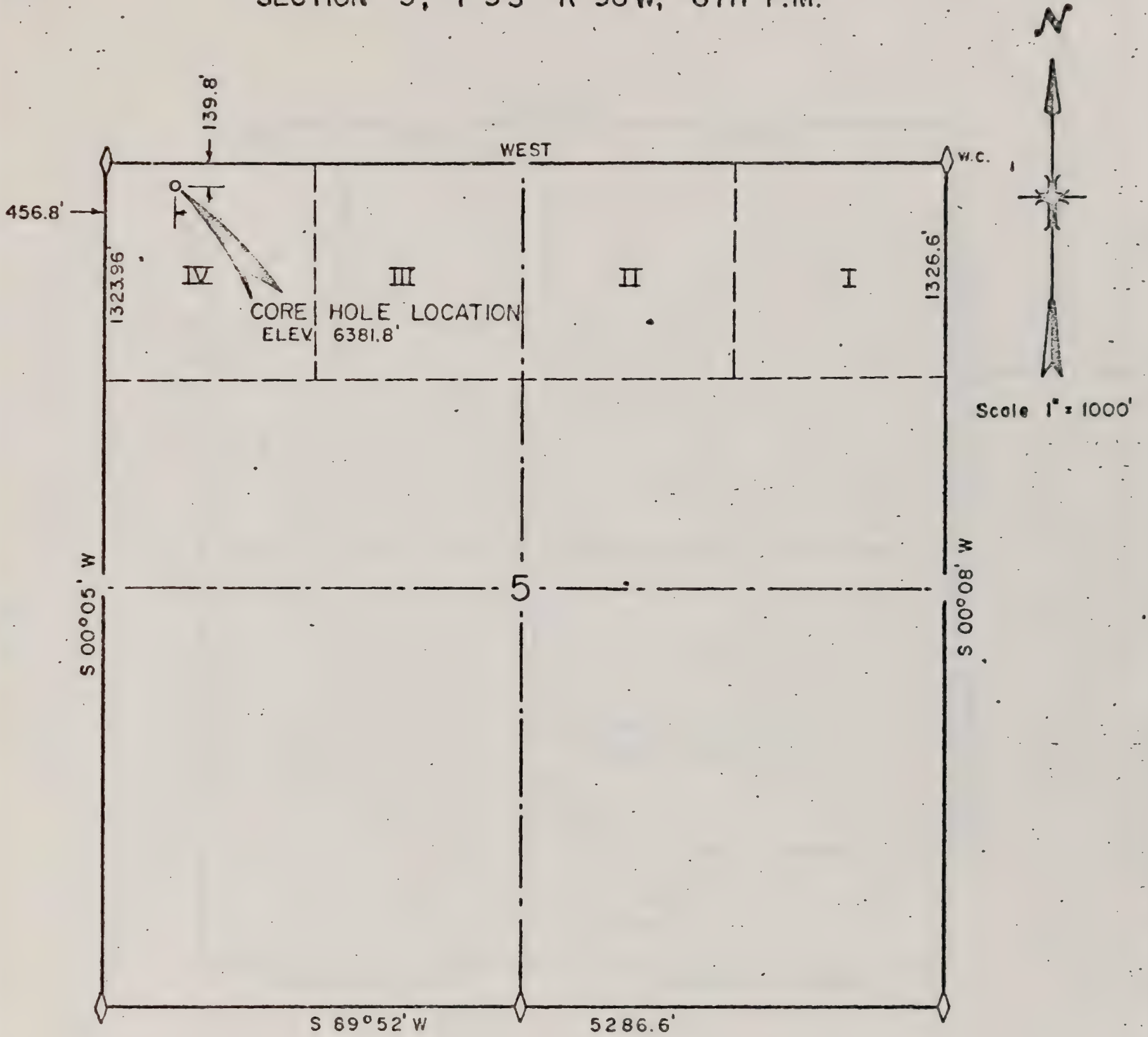
WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
S.G. № 18
RIO BLANCO COUNTY, COLORADO

SURVEYED C.B. DRAWN G.L.A.

GRAND JUNCTION, COLO. [illegible]

CORE HOLE LOCATION

139.8 FT. S.N.L. — 456.8 FT. E.W.L.
SECTION 5, T 3S R 96W, 6TH P.M.


N
139.8'
WEST
W.C.
456.8'
1323.96'
IV
III
II
I
1326.6'
CORE HOLE LOCATION
ELEV 6381.8'
Scale 1" = 1000'
S 00°05' W
5
S 00°08' W
S 89°52' W
5286.6'

Note: Elevation referred to U.S.G.S. datum.

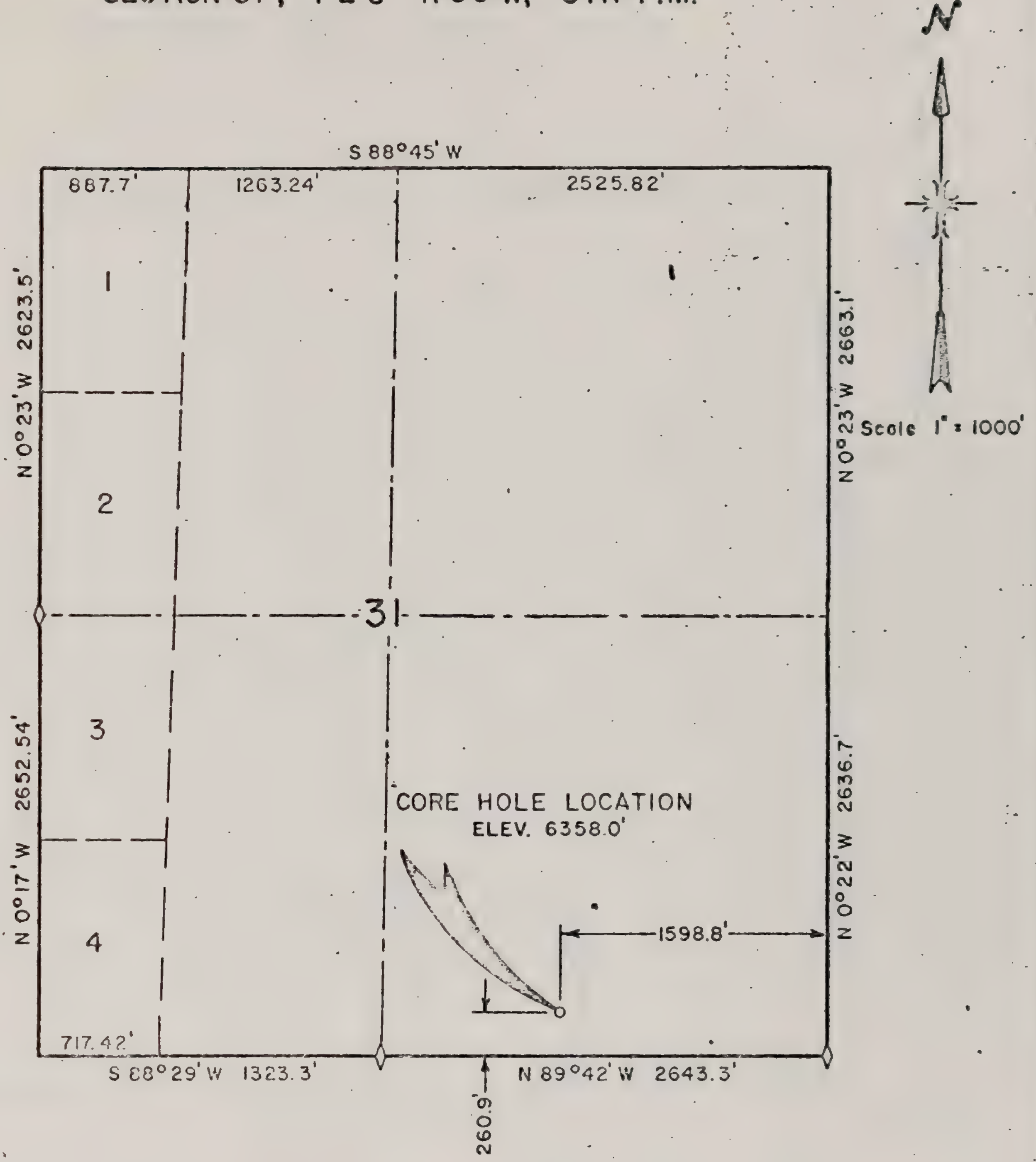
I, Clarence J Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Oct. 29, 1974.

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
SG-19
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN [illegible]
GRAND JUNCTION, COLO. 10/

CORE HOLE LOCATION

260.9 FT. N.S.L. — 1598.8 FT. W.E.L.
SECTION 31, T 2 S R 96 W, 6TH P.M.


N
Scale 1" = 1000'
S 88°45' W
887.7'
1263.24'
2525.82'
N 0°23' W 2623.5'
N 0°23' W 2663.1'
1
2
31
3
4
N 0°17' W 2652.54'
N 0°22' W 2636.7'
CORE HOLE LOCATION
ELEV. 6358.0'
1598.8'
717.42'
S 88°29' W 1323.3'
N 89°42' W 2643.3'
260.9'

Note: Elevation referred to U.S.G.S. datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Oct. 29, 1974.

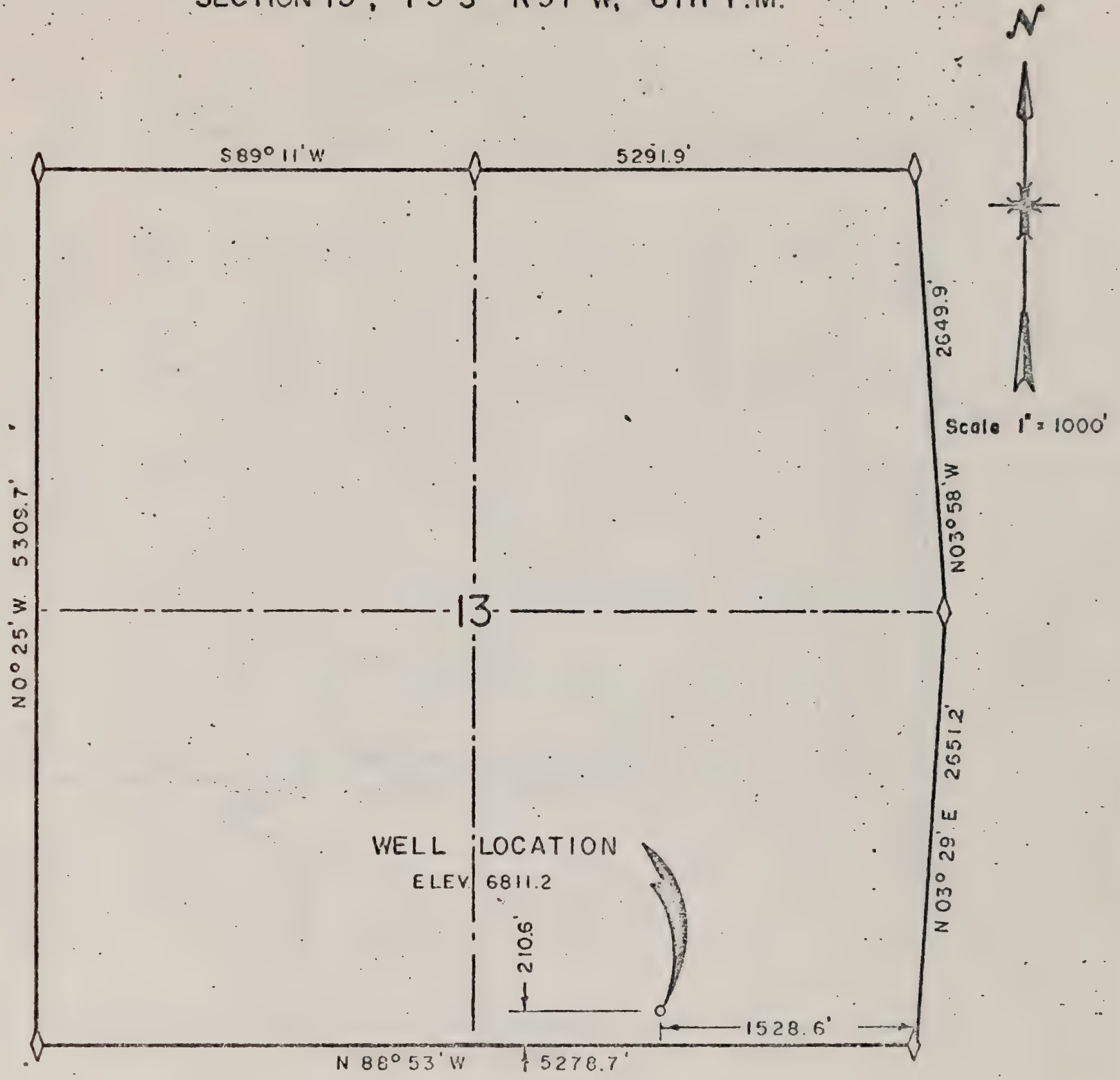
Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
SG — 20
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN [illegible] R.L.S.
GRAND JUNCTION, COLO. [illegible]

II B-24

CORE HOLE LOCATION

210.6 FT. N.S.L. — 1528.6 FT. W.E.L.
SECTION 13, T3 S R97 W, 6TH P.M.


N
S89° 11' W
5291.9'
2649.9'
Scale 1" = 1000'
N03° 58' W
N0° 25' W. 5309.7'
13
2651.2'
N 03° 29' E
WELL LOCATION
ELEV. 6811.2
210.6'
1528.6'
N 88° 53' W
5278.7'

NOTE: Elevation referred to U.S.G.S. datum.

I, Clarence J Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Oct. 28, 1974.

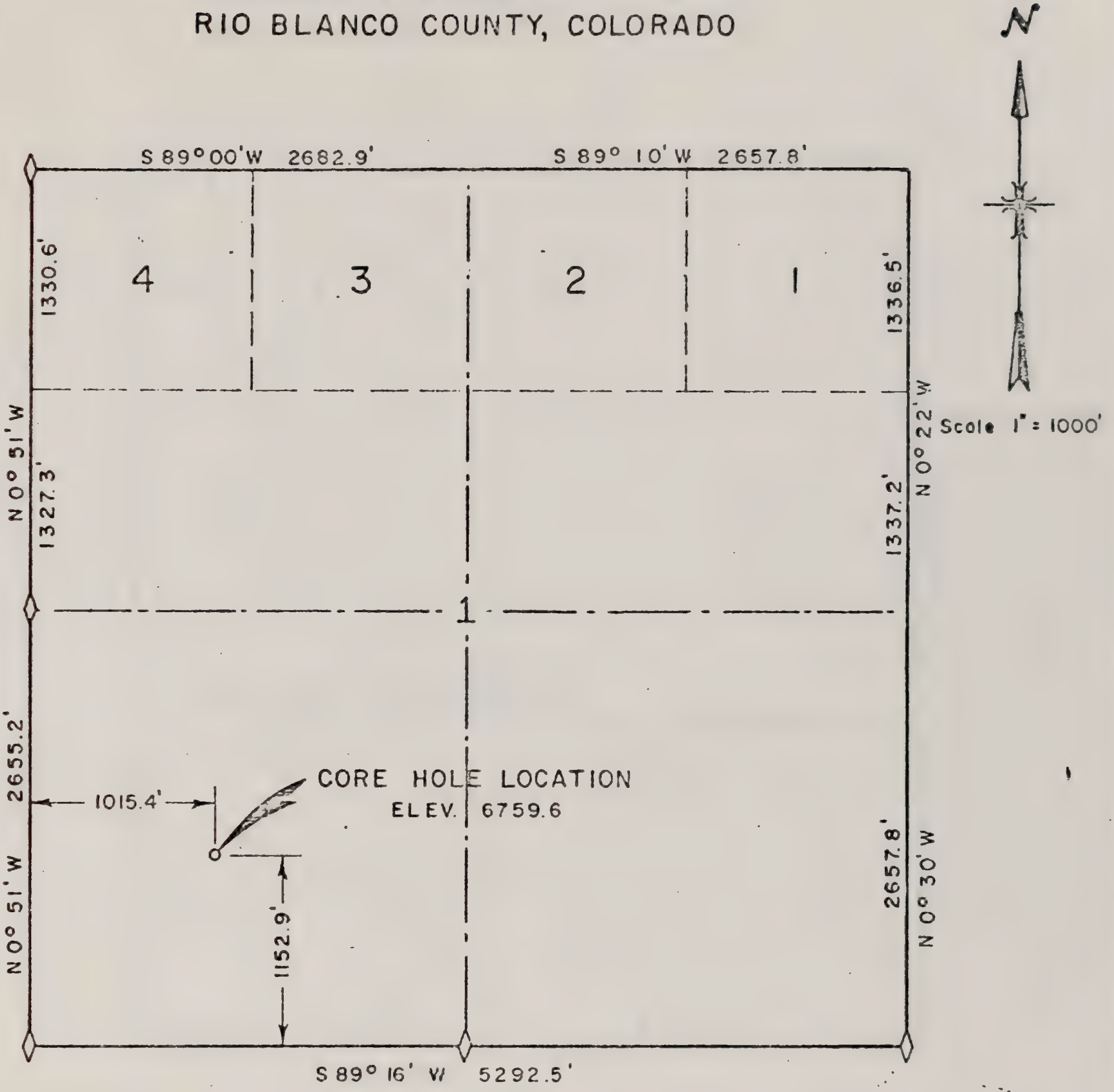
Clarence J. Bielak
Registered Land Surveyor.

II B-25

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
SG - 21
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN [illegible]
GRAND JUNCTION, COLO. 10/

COLORADO TRACT B
CORE HOLE LOCATION

1152.9 FT. N.S.L.–1015.4 E.W.L.
SECTION 1, T3S R97W 6th. P.M.
RIO BLANCO COUNTY, COLORADO


N
Scale 1" = 1000'
S 89°00'W 2682.9'
S 89° 10'W 2657.8'
4
3
2
1
1330.6'
1336.5'
N 0° 51'W 1327.3'
N 0° 22'W 1337.2'
1
N 0° 51'W 2655.2'
N 0° 30'W 2657.8'
1015.4'
CORE HOLE LOCATION
ELEV. 6759.6
1152.9'
S 89° 16' W 5292.5'

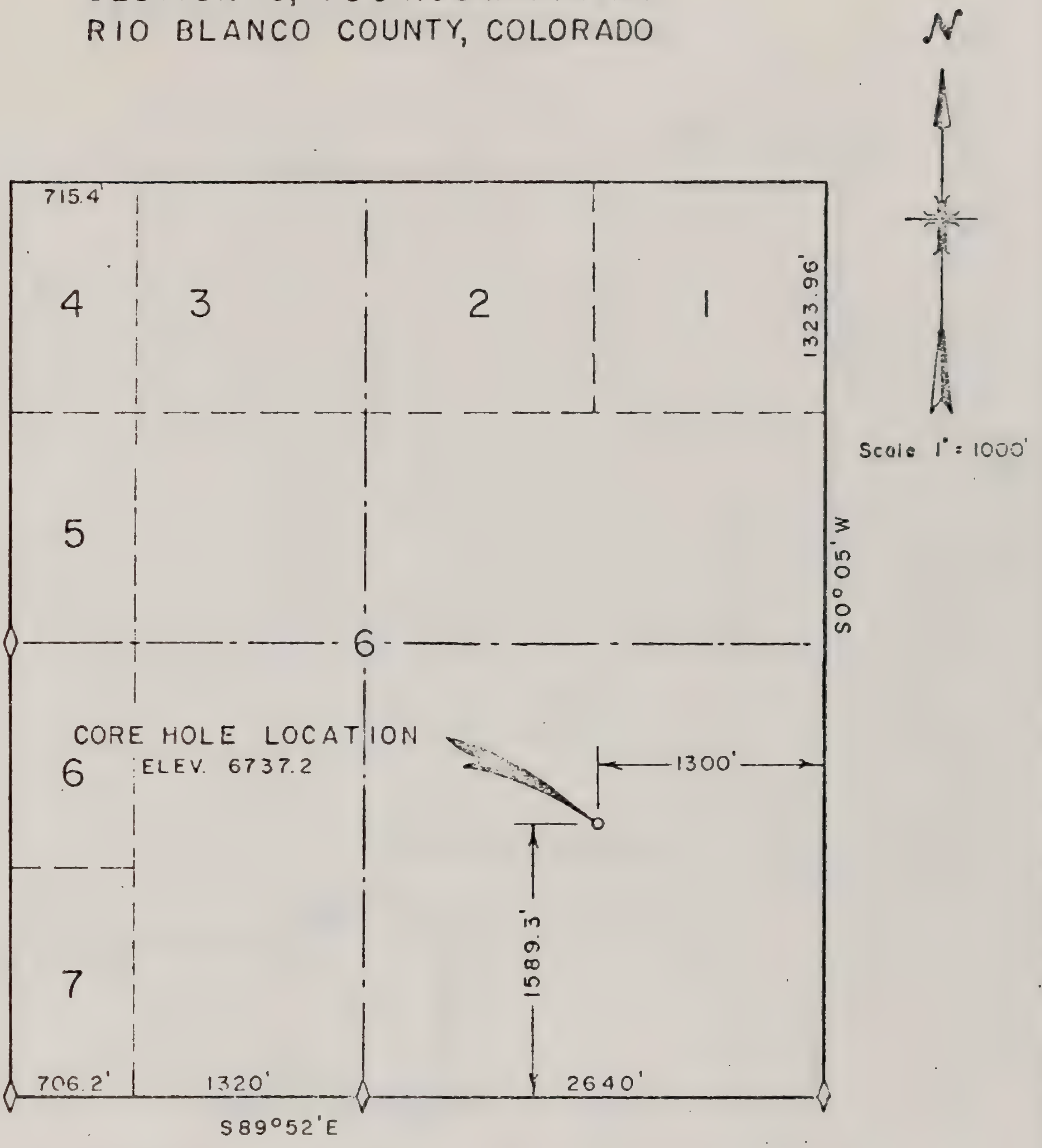
NOTE: Elev. referred to U.S.G.S.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on September 13, 1972.

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
THE OIL SHALE CORPORATION
C-b-1
RIO BLANCO COUNTY, COLORADO
SURVEYED CJB DRAWN GLA
GRAND JUNCTION, COLO. 9/15/7

COLORADO TRACT B
CORE HOLE LOCATION
1589.3 FT. N.S.L.– 1300.0 FT. W.E.L.
SECTION 6, T3S R96W 6TH. P.M.
RIO BLANCO COUNTY, COLORADO


N
Scale 1" = 1000'
715.4'
4
3
2
1
1323.96'
5
S0° 05' W
6
6
CORE HOLE LOCATION
ELEV. 6737.2
1300'
1589.3'
7
706.2'
1320'
2640'
S89°52'E

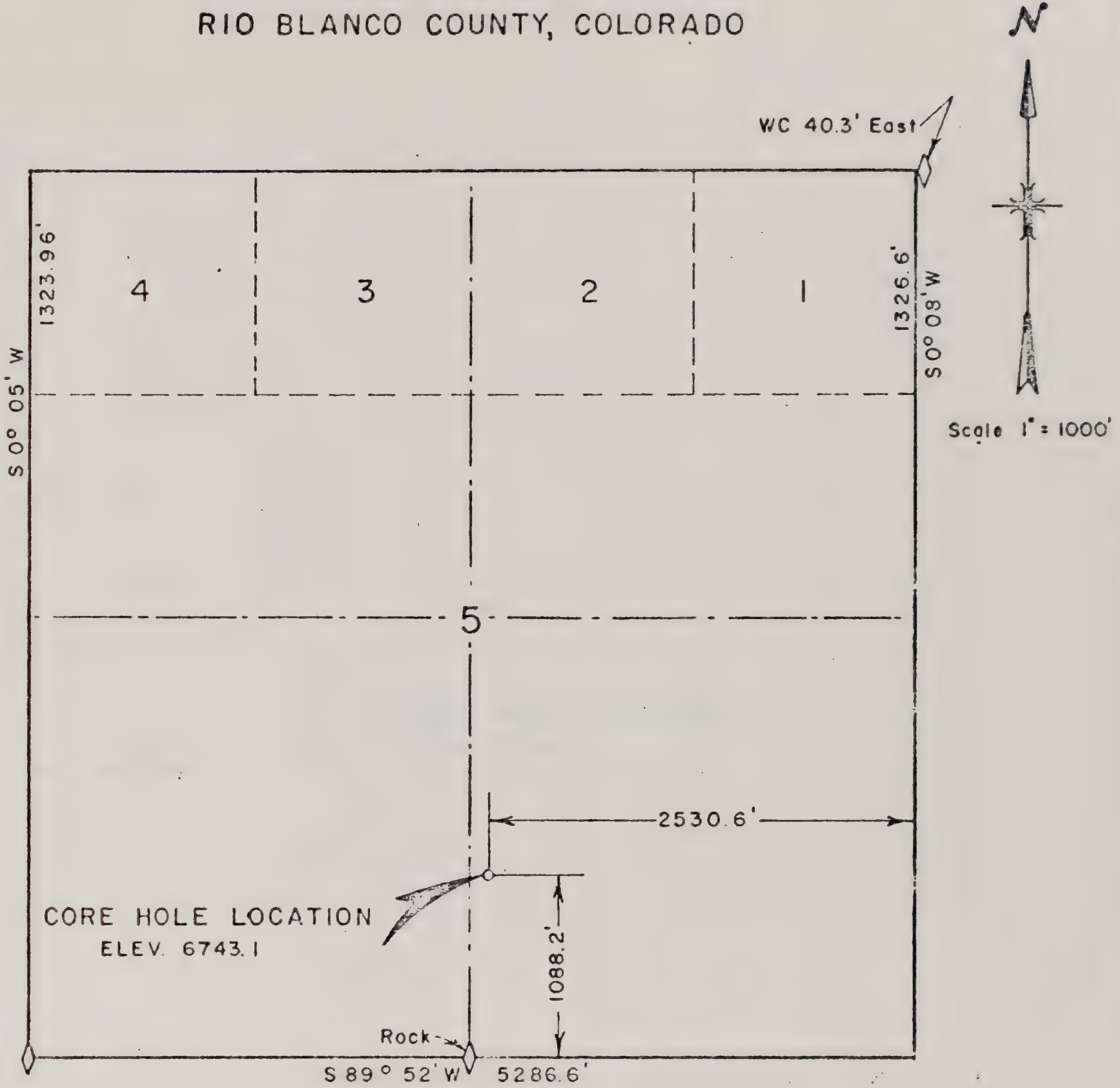
NOTE: Elev. referred to USGS datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on September 13, 1972

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
THE OIL SHALE CORPORATION
C-b-2
RIO BLANCO COUNTY, COLORADO
SURVEYED CJB DRAWN GLA
GRAND JUNCTION, COLO. 9/15/72

COLORADO TRACT B
CORE HOLE LOCATION
1088.2 FT. N.S.L.-2530.6 W.E.L.
SECTION 5, T3S R96W 6th. P.M.
RIO BLANCO COUNTY, COLORADO


N
WC 40.3' East
Scale 1" = 1000'
1323.96'
S 0° 05' W
4
3
2
1
1326.6'
S 0° 08' W
5
2530.6'
CORE HOLE LOCATION
ELEV. 6743.1
1088.2'
Rock
S 89° 52' W
5286.6'

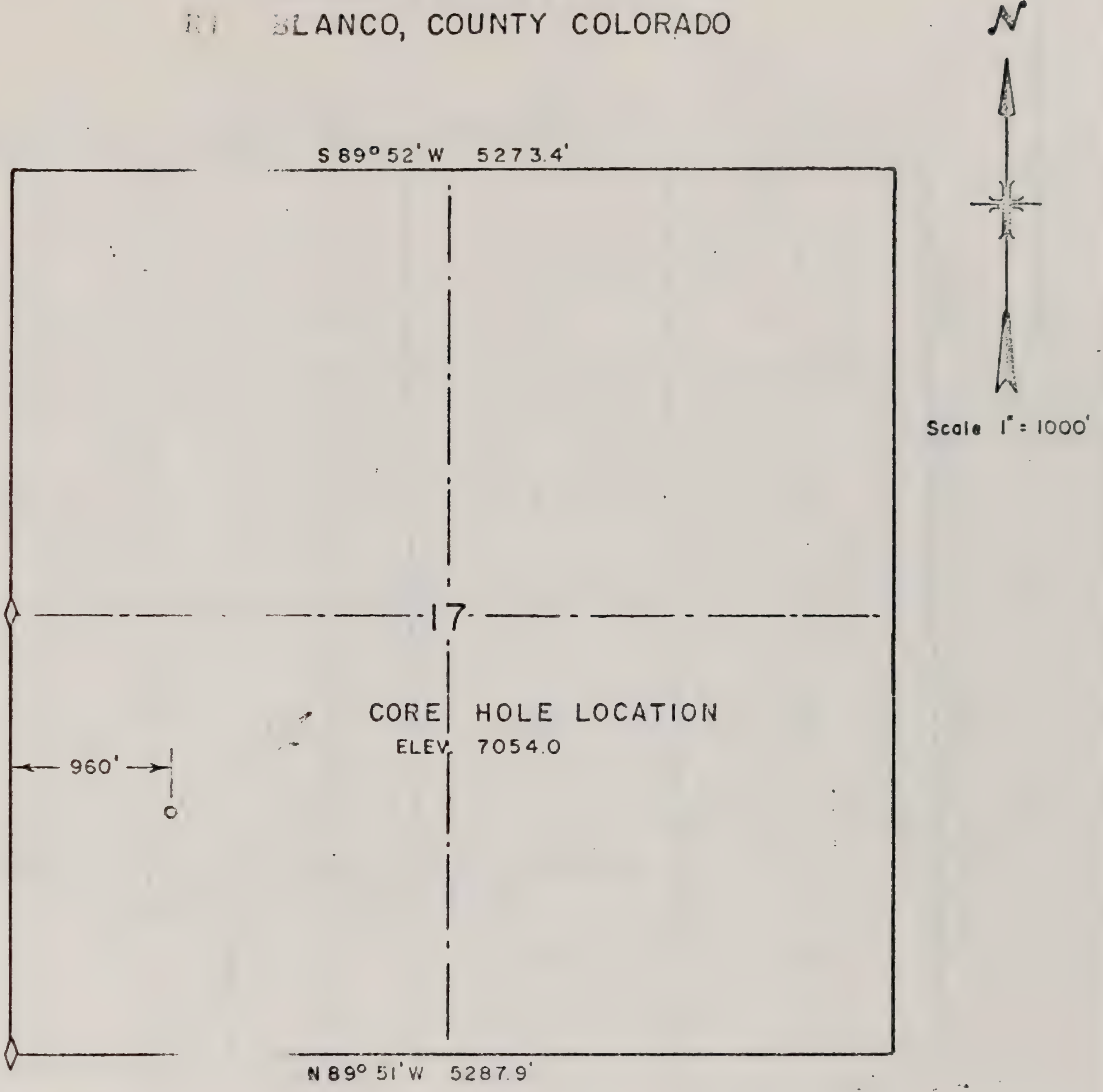
NOTE: Elev. referred to U S G S datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on September 14, 1972.

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
THE OIL SHALE CORPORATION
C-b-3
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN G.L.A.
GRAND JUNCTION, COLO. 9/15/72

COLORADO TRACT B
CORE HOLE LOCATION
FT. N.S.L.– 960.0 FT. E.W.L.
ON 17, T3S R96 W 6TH PM.
RI BLANCO, COUNTY COLORADO


N
Scale 1" = 1000'
S 89° 52' W 5273.4'
17
CORE HOLE LOCATION
ELEV. 7054.0
960'
N 89° 51' W 5287.9'

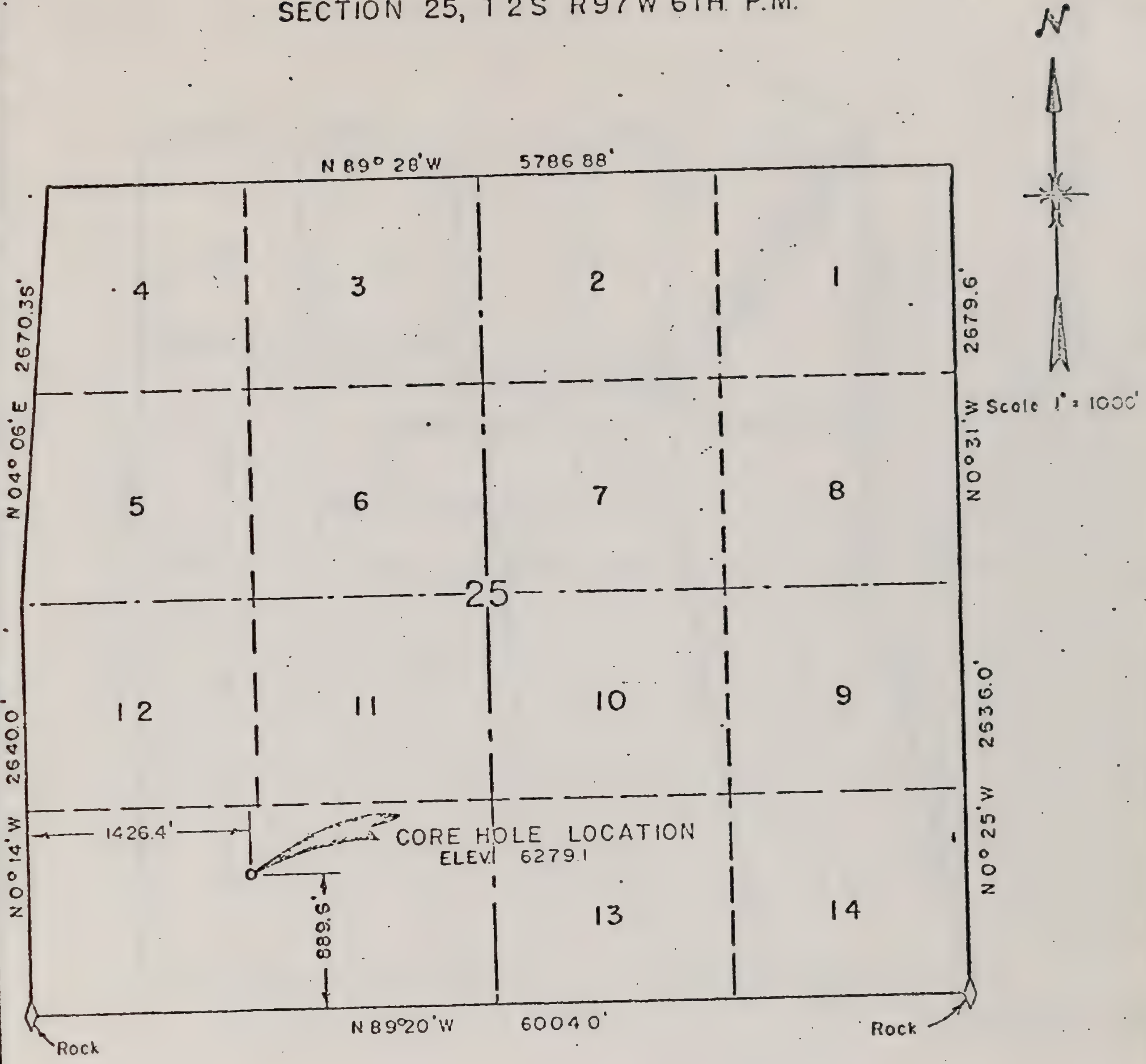
NOTE: Elev. re to USGS datum.

I, Clarence J. Bi do hereby certify that this plat was plotted from no field survey made under my direct responsibilit, vision and checking on September 14, 197

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
THE OIL SHALE CORPORATION
C–b–4
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN G.L.A.
GRAND JUNCTION, COLO.

CORE HOLE LOCATION
889.6 FT. N.S.L.- 1426.4 FT. E.W.L.
SECTION 25, T2S R97W 6TH. P.M.


N
N 89° 28'W
5786 88'
4
3
2
1
N 04° 06' E 2670.35'
2679.6'
N 0° 31' W
Scale 1" = 1000'
5
6
7
8
25
12
11
10
9
N 0° 14' W 2640.0'
2636.0'
N 0° 25' W
1426.4'
CORE HOLE LOCATION
ELEV. 6279.1
889.6'
13
14
N 89°20' W
6004 0'
Rock
Rock

NOTE: Elevation referred to U.S.G.S. datum.

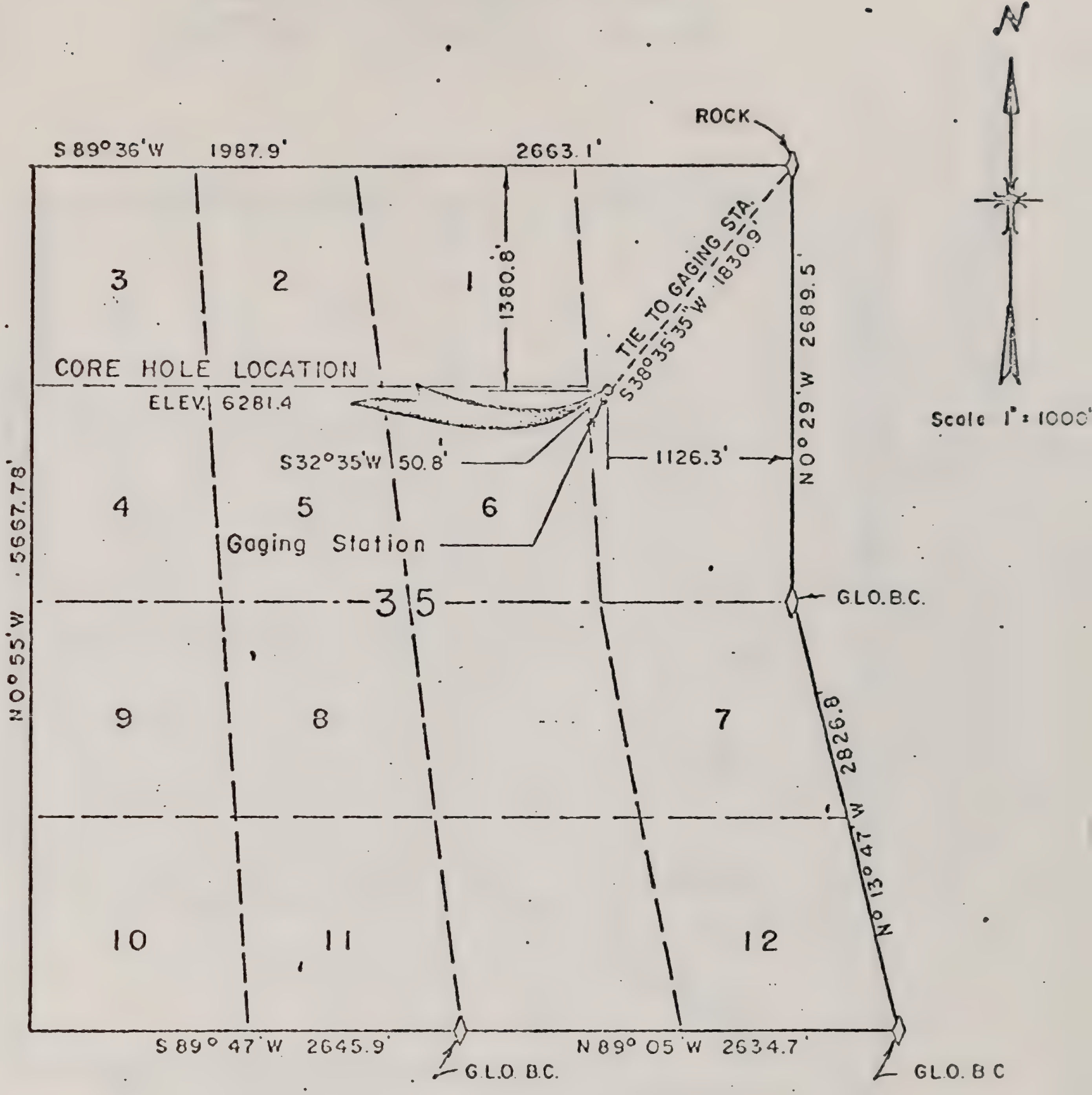
I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 24, 1974.

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, IN
CORE HOLE LOCATIO
ATLANTIC RICHFIELD
A-1
RIO BLANCO COUNTY, COLO
SURVEYED CJB DRAWN
GRAND JUNCTION, COLO. 7/

II B-30

CORE HOLE LOCATION
1380.8 FT. S.N.L.– 1126.3 FT. W.E.L.
SECTION 35, T2S R97W 6TH. P.M.


N
Scale 1" = 1000'
ROCK
S 89° 36' W 1987.9'
2663.1'
3
2
1
1380.8'
TIE TO GAGING STA.
S 38° 35' 35" W 1830.9'
N 0° 29' W 2689.5'
CORE HOLE LOCATION
ELEV. 6281.4
S 32° 35' W 50.8'
1126.3'
4
5
6
Gaging Station
N 0° 55' W 5667.78'
35
G.L.O. B.C.
9
8
7
2826.8'
N 13° 47' W
10
11
12
S 89° 47' W 2645.9'
N 89° 05' W 2634.7'
G.L.O. B.C.
G.L.O. B.C.

NOTE- Elevation refered to U.S.G.S. datum.

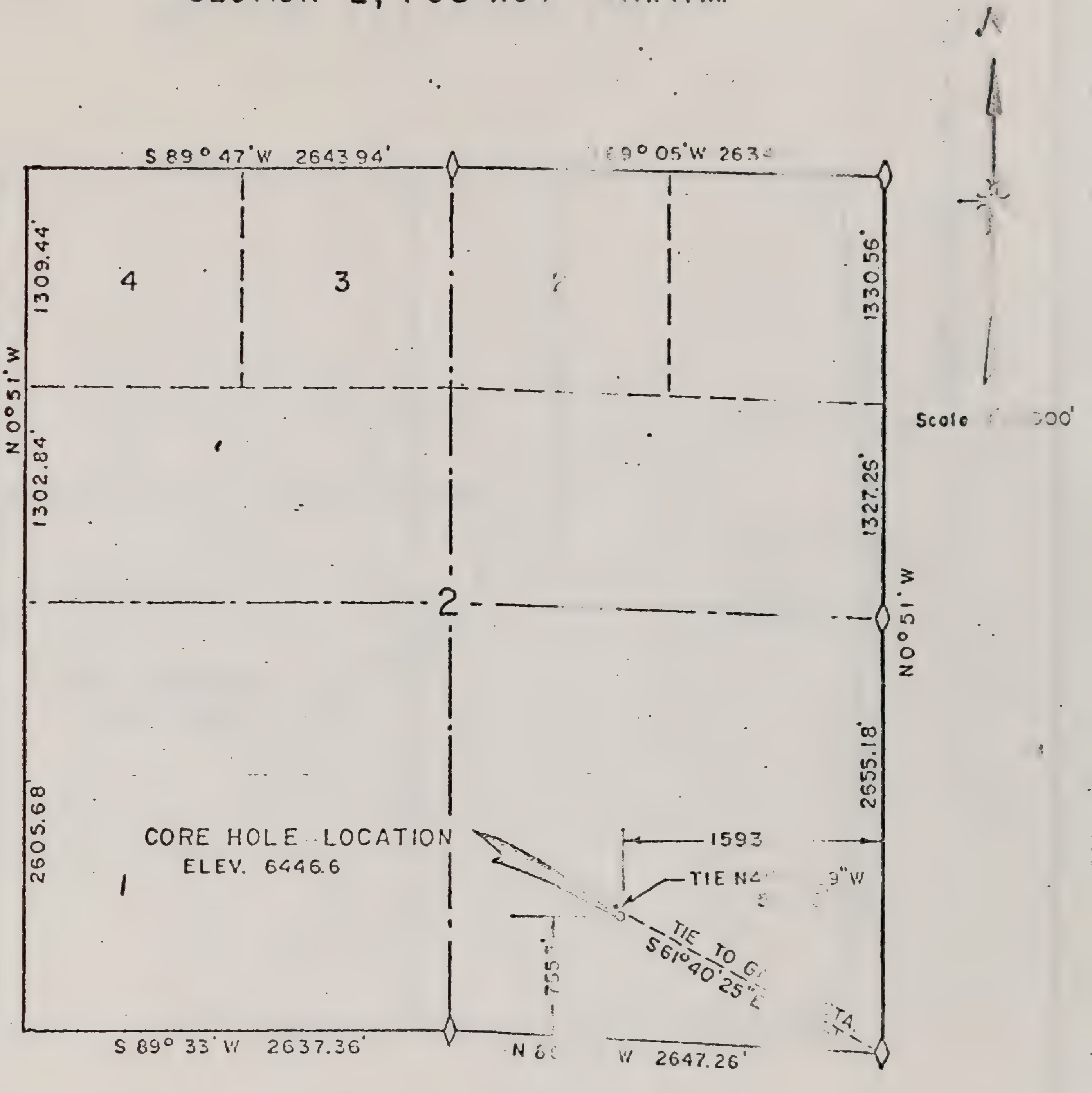
I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 24, 1974.

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, IN
CORE HOLE LOCATIO
ATLANTIC RICHFIELD
A-2
RIO BLANCO COUNTY, CO
SURVEYED CJB DRAWN
GRAND JUNCTION, CO

II B-31

CORE HOLE LOCA ON
755.5 FT. N.S.L.-1593. E W.E.L.
SECTION 2, T3S R97 TH. P.M.



S 89° 47' W 2643.94'
89° 05' W 263
N 0° 51' W
1309.44'
1302.84'
2605.68'
4
3
2
1
1330.56'
1327.25'
2655.18'
N 0° 51' W
Scale 000'
CORE HOLE LOCATION
ELEV. 6446.6
1593
TIE N4 9"W
TIE TO G
S 61° 40' 25" E
755
TA.
S 89° 33' W 2637.36'
N 8 W 2647.26'

NOTE: Elevation refered to USGS datum.

I, Clarence J Bielak do hereby certify that plat was plotted from notes of a field survey made u my direct responsibility, supervision and checki . July 30, 1974.

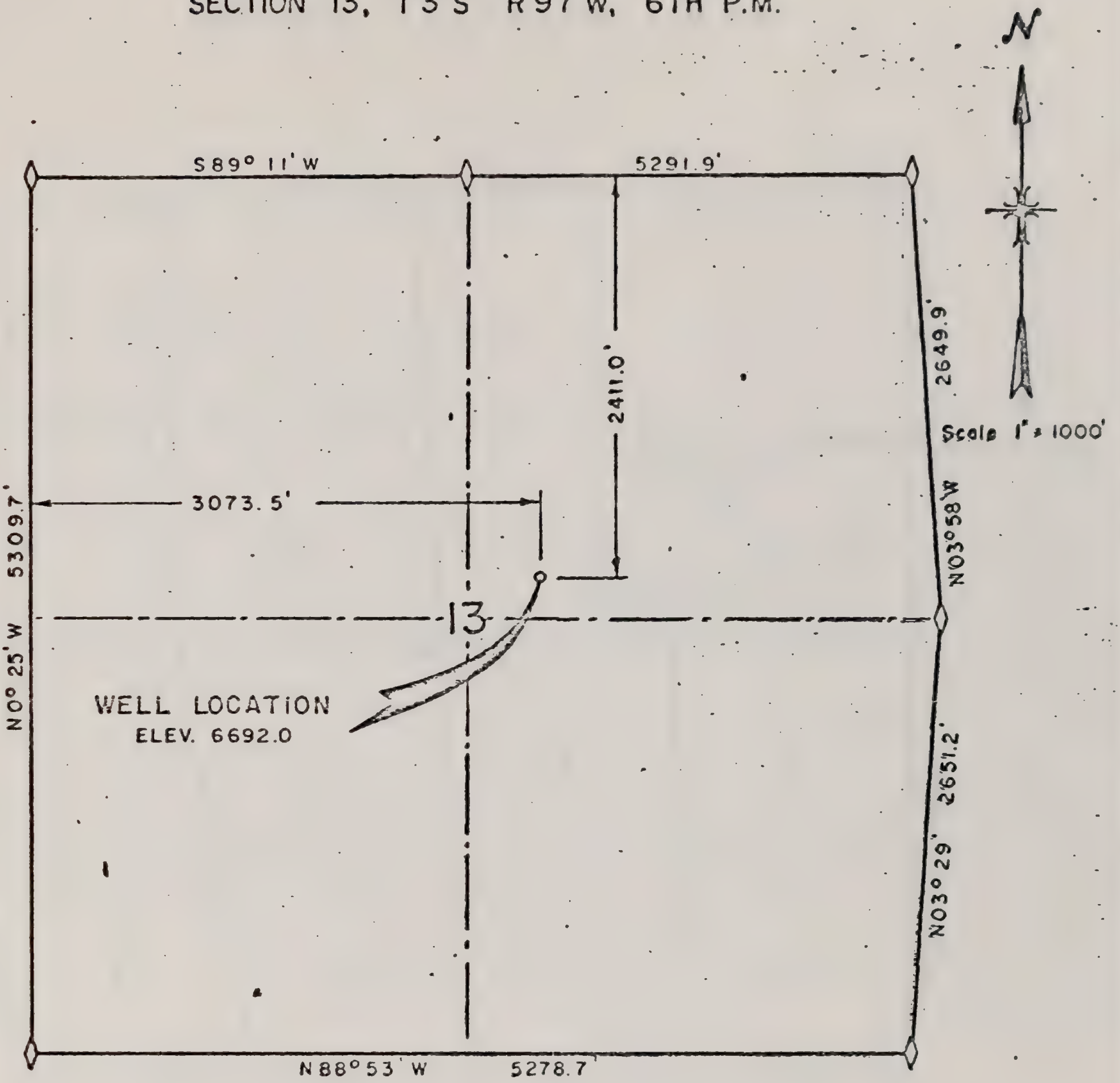
Registered Land Surv

II B-32

W RN ENGINE IC.
C OLE LOCA N
NTIC RICH D
A-3
R CO COUNTY
SU C J B DR A
GRA CTION, CO D

CORE HOLE LOCATION

2411.0 FT. S.N.L. – 3073.5 FT. E.W.L.
SECTION 13, T3S R97W, 6TH P.M.


N
S89° 11' W
5291.9'
2649.9'
2411.0'
Scale 1" = 1000'
3073.5'
5309.7'
N0° 25' W
N03° 58' W
13
WELL LOCATION
ELEV. 6692.0
2651.2'
N03° 29'
N88° 53' W
5278.7'

NOTE: Elevation referred to U.S.G.S. datum.

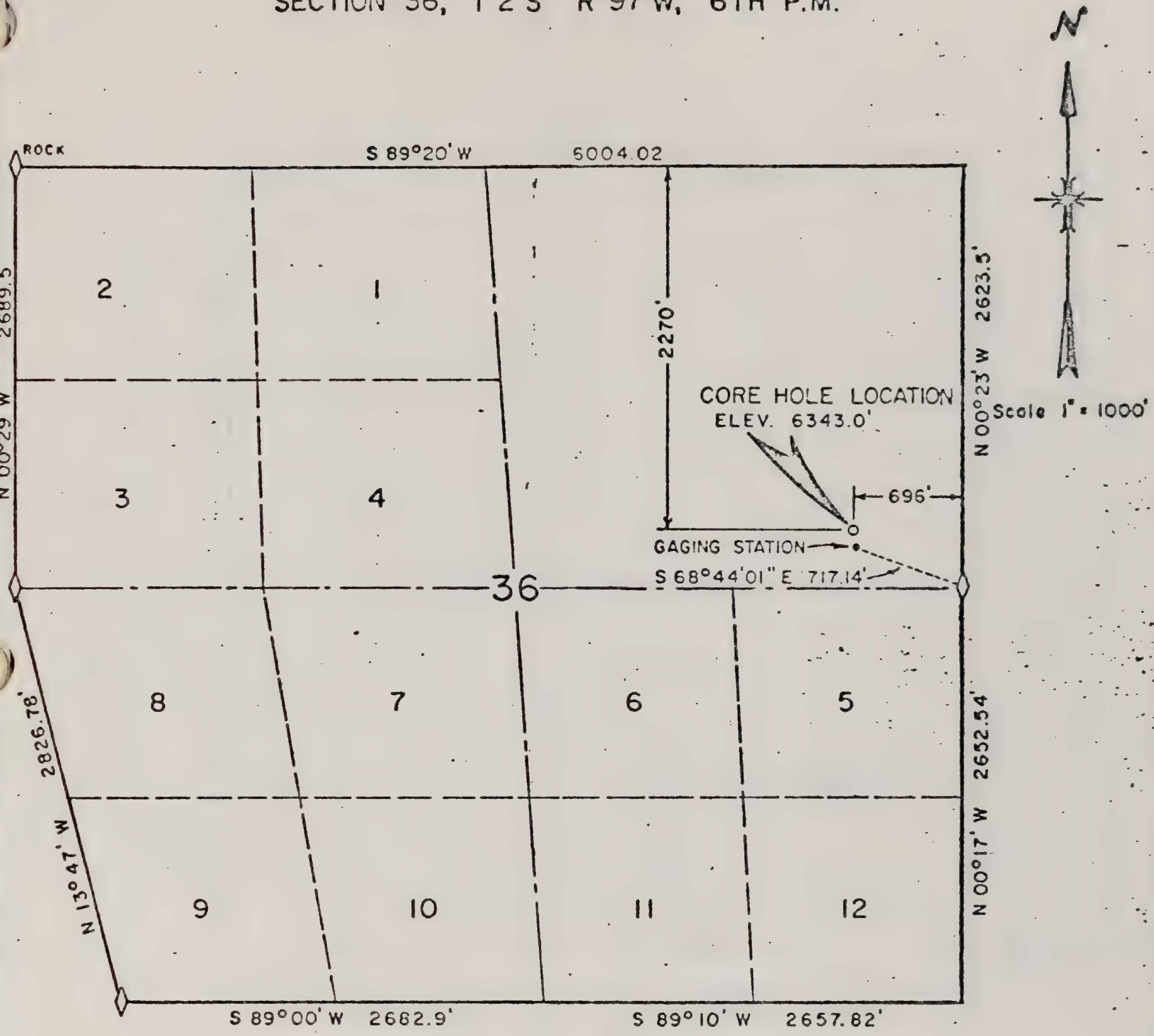
I, Clarence J Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Oct 28, 1974.

Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A-4
RIO BLANCO COUNTY, COLO.
[illegible]
[illegible]

CORE HOLE LOCATION

2270.0 FT. S.N.L. — 696.0 FT. W.E.L.
SECTION 36, T 2 S R 97 W, 6TH P.M.


N
ROCK
S 89°20' W
5004.02
N 00°29' W 2689.5'
N 00°23' W 2623.5'
Scale 1" = 1000'
2270'
CORE HOLE LOCATION
ELEV. 6343.0'
696'
GAGING STATION
S 68°44'01" E 717.14'
36
1
2
3
4
5
6
7
8
9
10
11
12
N 13°47' W 2826.78'
N 00°17' W 2652.54'
S 89°00' W 2682.9'
S 89°10' W 2657.82'

Note: Elevation referred to U.S.G.S. datum.

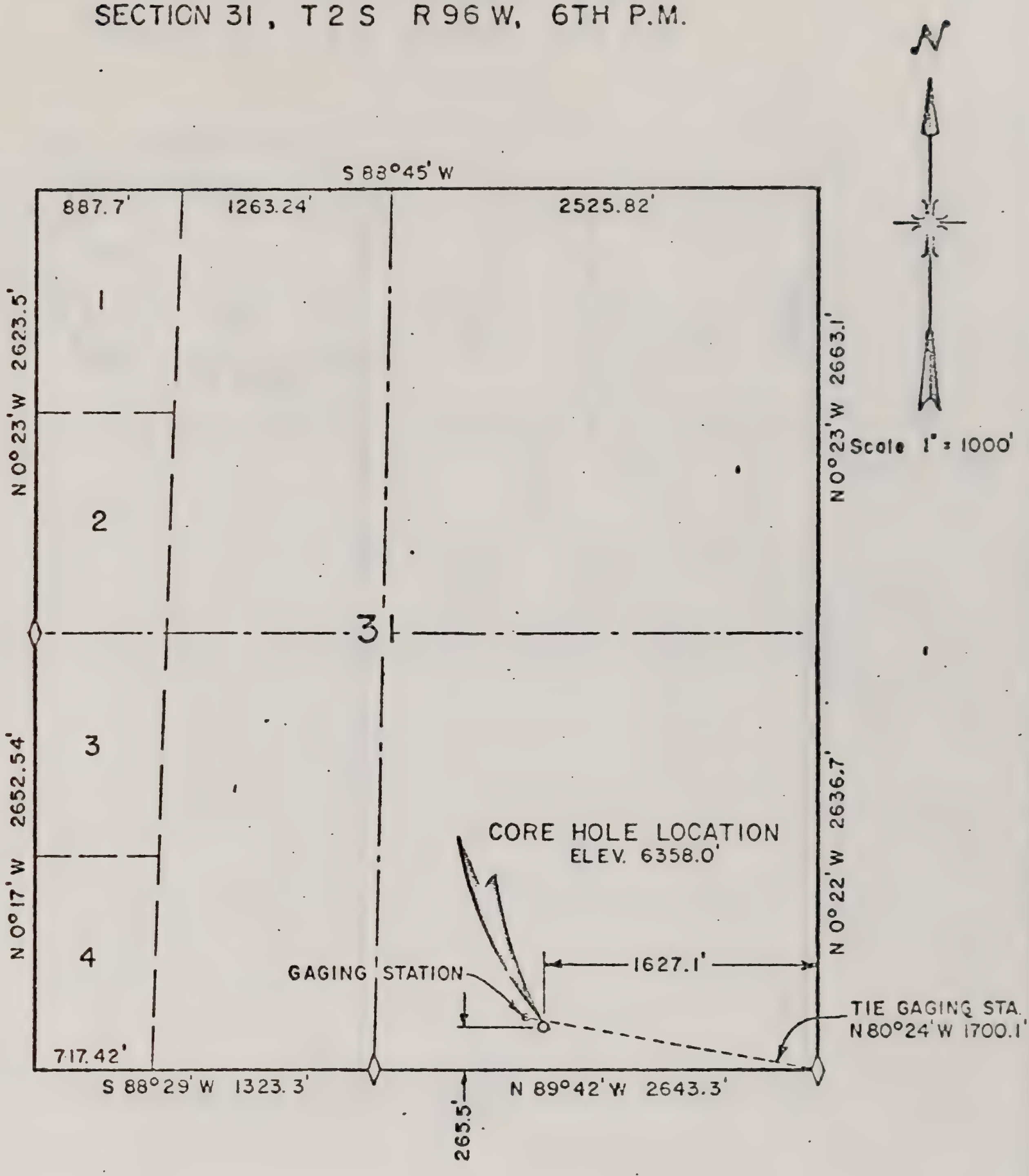
I, Clarence J Bielak do hereby certify that this plot was plotted from notes of a field survey made under my direct responsibility, supervision and checking on [illegible]

Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A — 5
[illegible] COLORADO
[illegible]
[illegible] COLO. [illegible]

CORE HOLE LOCATION

265.5 FT. N.S.L. — 1627.1 FT. W.E.L.
SECTION 31, T 2 S R 96 W, 6TH P.M.


N
Scale 1" = 1000'
S 88°45' W
887.7'
1263.24'
2525.82'
N 0°23' W 2623.5'
N 0°23' W 2663.1'
1
2
3
4
31
N 0°17' W 2652.54'
N 0°22' W 2636.7'
CORE HOLE LOCATION
ELEV. 6358.0'
GAGING STATION
1627.1'
TIE GAGING STA.
N 80°24' W 1700.1'
717.42'
S 88°29' W 1323.3'
N 89°42' W 2643.3'
265.5'

Note: Elevation referred to U.S.G.S. datum.

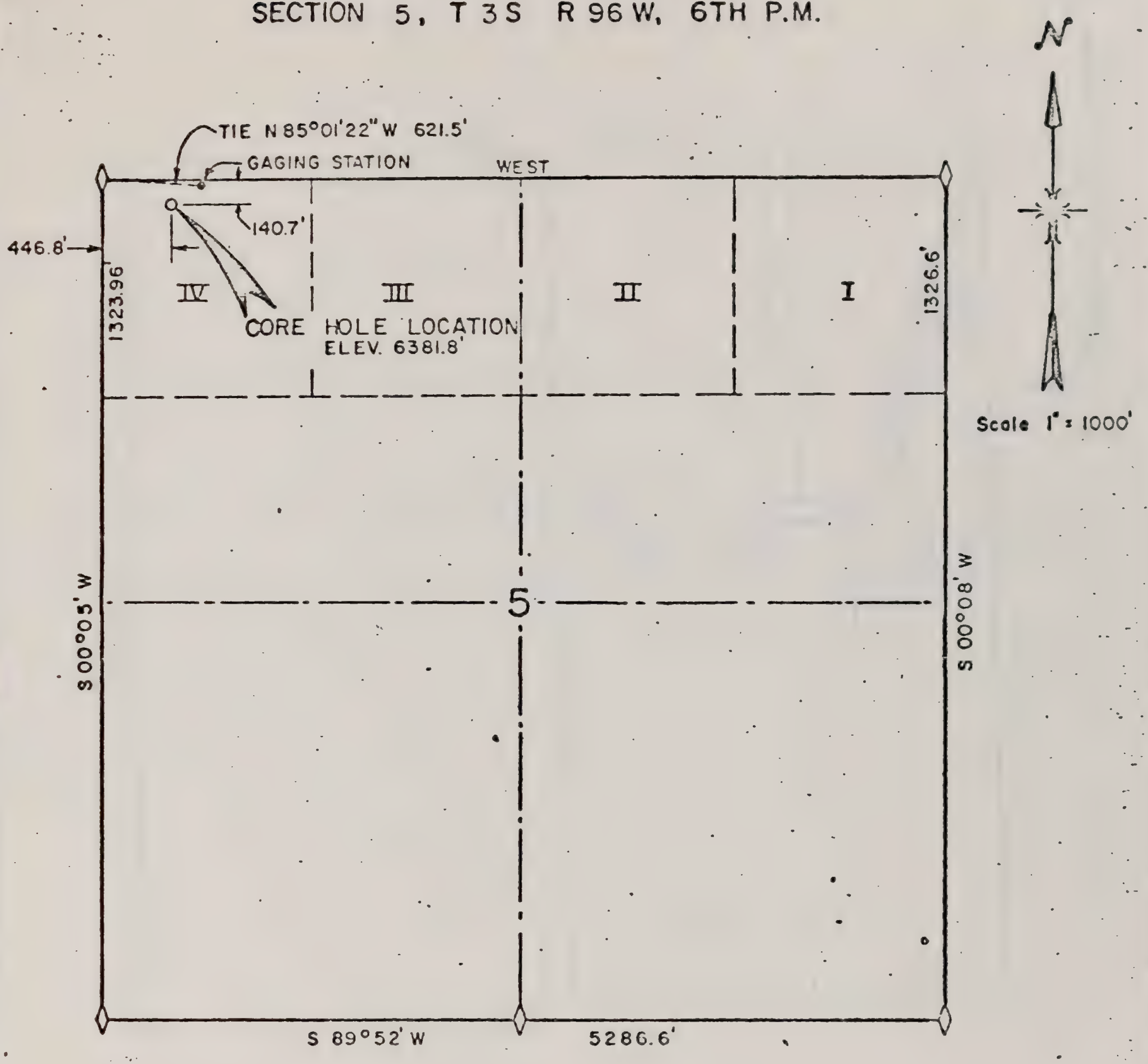
I, Clarence J Bielck do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Oct. 29, 1974.

Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A — 6
RIO BLANCO COUNTY, COLORADO
[illegible]
GRAND JUNCTION, COLO.

CORE HOLE LOCATION

140.7 FT. S.N.L. — 446.8 FT. E.W.L.
SECTION 5, T 3 S R 96 W, 6TH P.M.


N
TIE N 85°01'22" W 621.5'
GAGING STATION
WEST
140.7'
446.8'
1323.96'
1326.6'
IV
III
II
I
CORE HOLE LOCATION
ELEV. 6381.8'
Scale 1" = 1000'
S 00°05' W
S 00°08' W
5
S 89°52' W
5286.6'

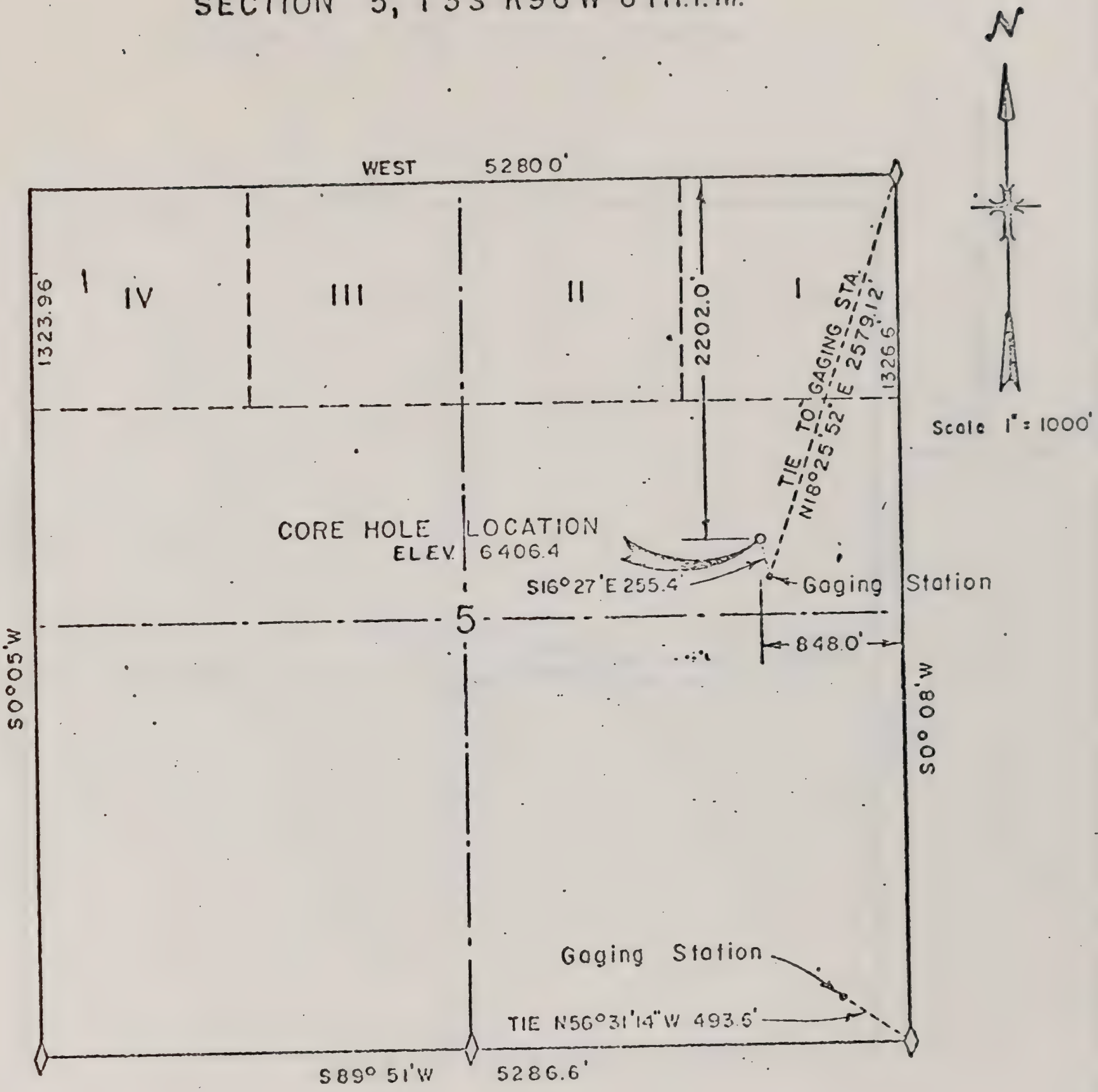
Note: Elevation referred to U.S.G.S. datum.

I, Clarence J Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Oct. 29, 1974.

Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A--7
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J
[illegible]

CORE HOLE LOCATION
2202.0 FT. S.N.L.-848.0 FT. W.E.L.
SECTION 5, T3S R96W 6TH.P.M.


N
Scale 1" = 1000'
WEST 5280.0'
IV
III
II
I
1323.96
2202.0'
1326.5
TIE TO GAGING STA.
N18°25'52"E 2579.12'
CORE HOLE LOCATION
ELEV. 6406.4
S16°27'E 255.4
Gaging Station
5
848.0'
S0°05'W
S0°08'W
Gaging Station
TIE N56°31'14"W 493.5'
S89°51'W 5286.6'

NOTE: Elevation refered to U.S.G.S. datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 25, 1974.

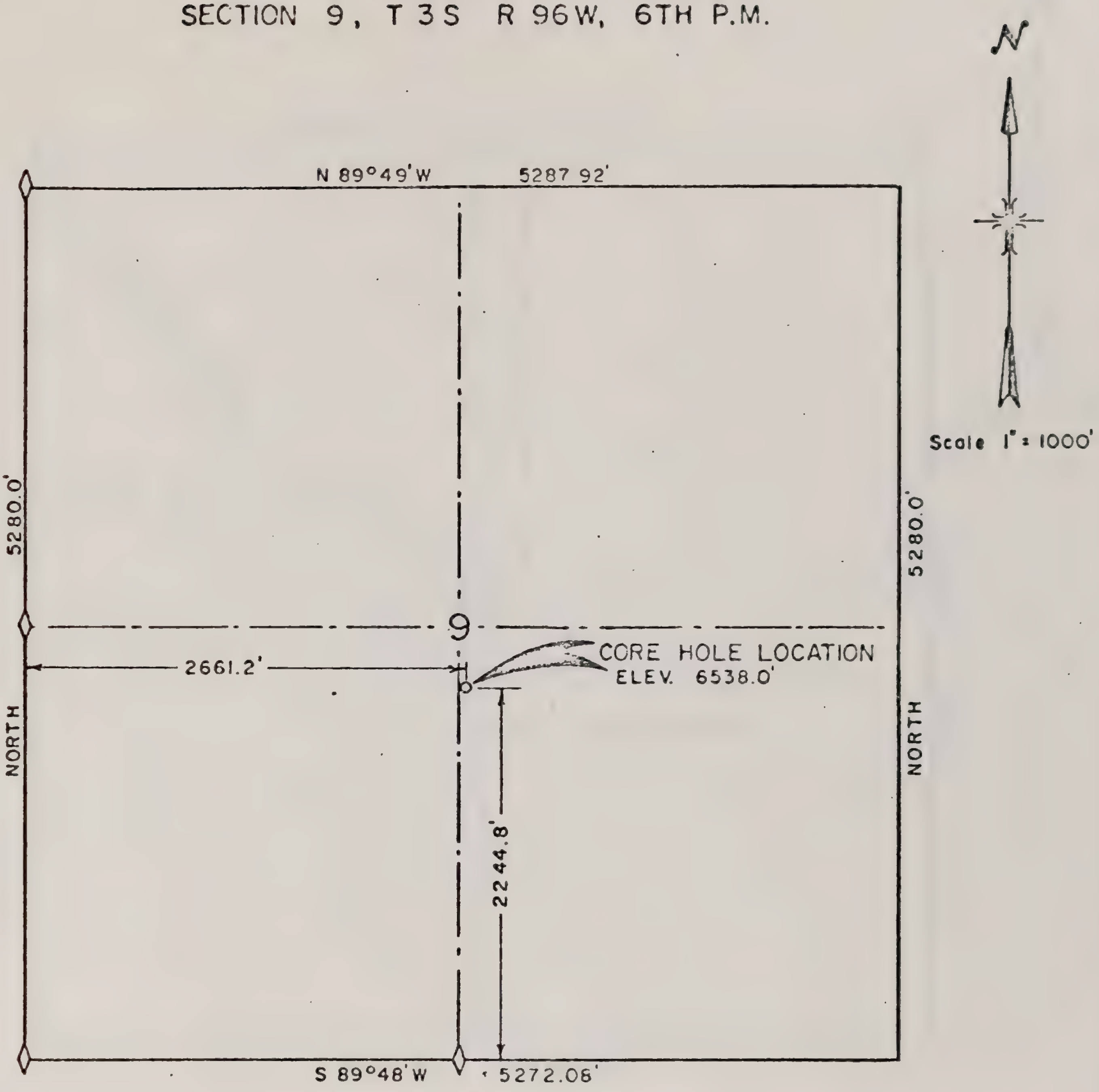
Registered Land Surveyor

II B-37

WESTERN ENGINEERS, INC
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A-8
RIO BLANCO COUNTY, COLOR
SURVEYED CJB DRAWN
GRAND JUNCTION, COLO.

CORE HOLE LOCATION

2244.8 FT. N.S.L. — 2661.2 FT. E.W.L.
SECTION 9, T 3 S R 96 W, 6TH P.M.


N
Scale 1" = 1000'
N 89°49'W
5287.92'
5280.0'
NORTH
5280.0'
NORTH
9
2661.2'
CORE HOLE LOCATION
ELEV. 6538.0'
2244.8'
S 89°48'W
5272.08'

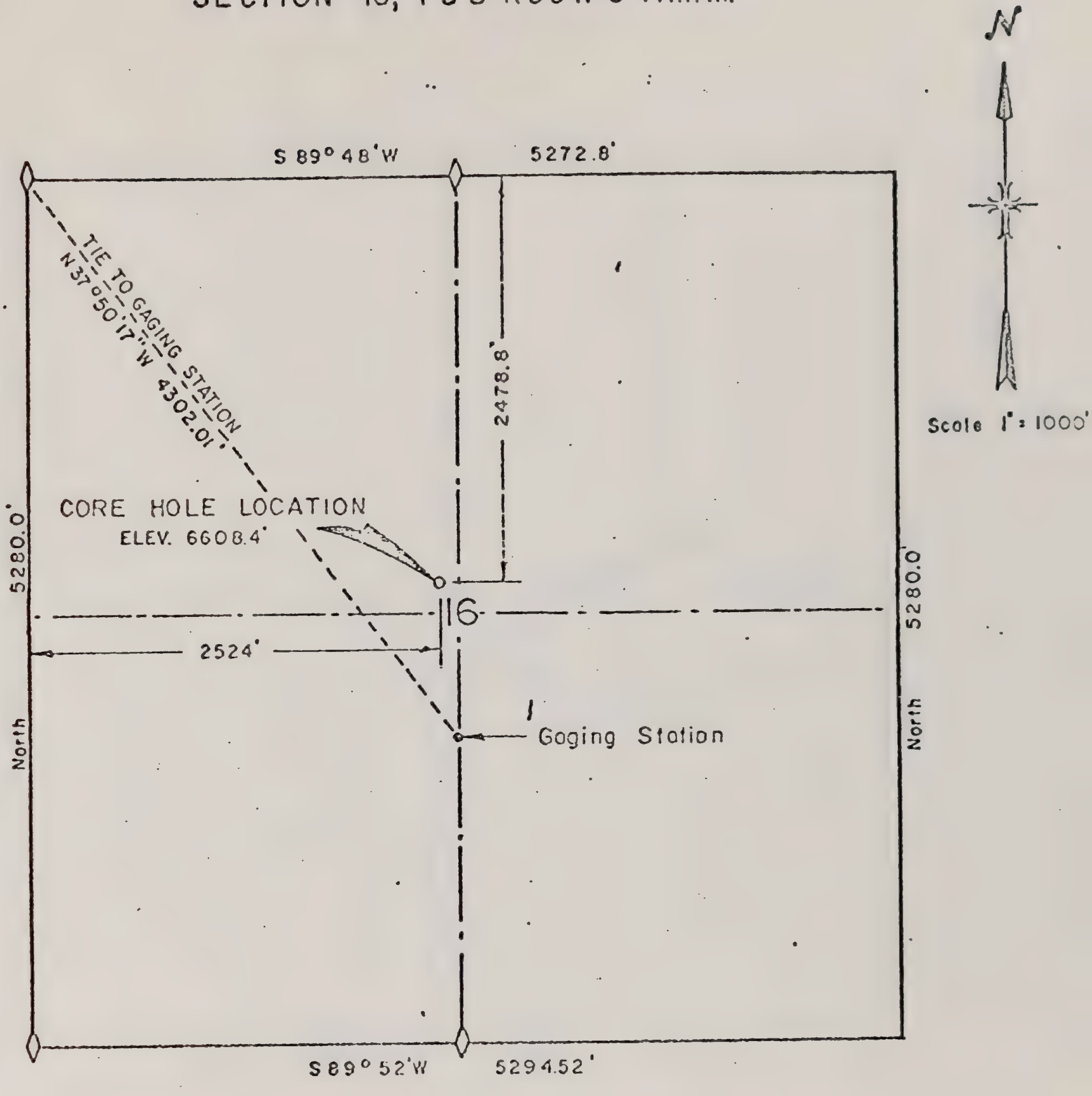
Note: Elevation referred to U.S.G.S. datum

I, Clarence J Bielak do hereby certify that this plot was plotted from notes of a field survey made under my direct responsibility, supervision and checking on Oct. [illegible], 1974.

Registered Land Surveyor

WESTERN ENGINEERS, INC.
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A — 9
RIO BLANCO COUNTY, COLORADO
SURVEYED C.J.B. DRAWN [illegible]
GRAND JUNCTION, COLO.

CORE HOLE LOCATION
2478.8 FT. S.N.L.- 2524.0 FT. W.E.L.
SECTION 16, T 3 S R 96 W 6 TH. P.M.


N
S 89° 48' W
5272.8'
TIE TO GAGING STATION
N 37° 50' 17" W 4302.01'
2478.8'
Scale 1" = 1000'
CORE HOLE LOCATION
ELEV. 6608.4'
5280.0'
North
16
2524'
5280.0'
North
Gaging Station
S 89° 52' W
5294.52'

NOTE: Elevation refered to U.S.G.S. datum.

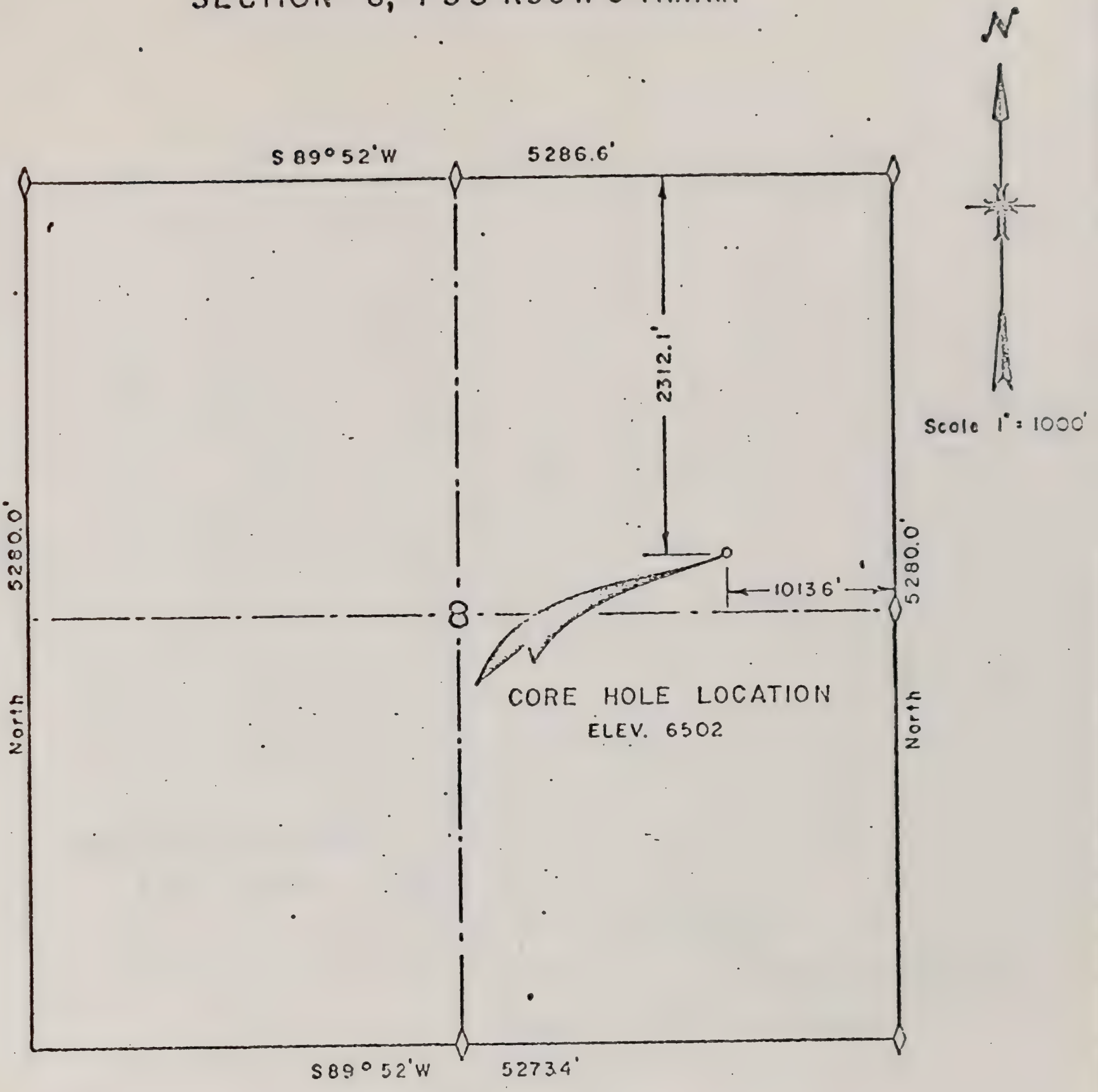
I, Clerence J Bielak do hereby certify that this plot was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 25, 1974.

II B-39

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS,
CORE HOLE LOCATIO
ATLANTIC RICHFIELD
A - 10
RIO BLANCO COUNTY, CO
SURVEYED C.J.B. DRAWN
GRAND JUNCTION, CO

CORE HOLE LOCATION
2312.1 FT. S.N.L. – 1013.6 FT. W.E.L.
SECTION 8, T 3 S R96 W 6 TH.P.M.


N
Scale 1" = 1000'
S 89°52'W
5286.6'
2312.1'
5280.0'
North
8
1013.6'
5280.0'
North
CORE HOLE LOCATION
ELEV. 6502
S89°52'W
5273.4'

NOTE: Elevation refered to U.S.G.S. datum.

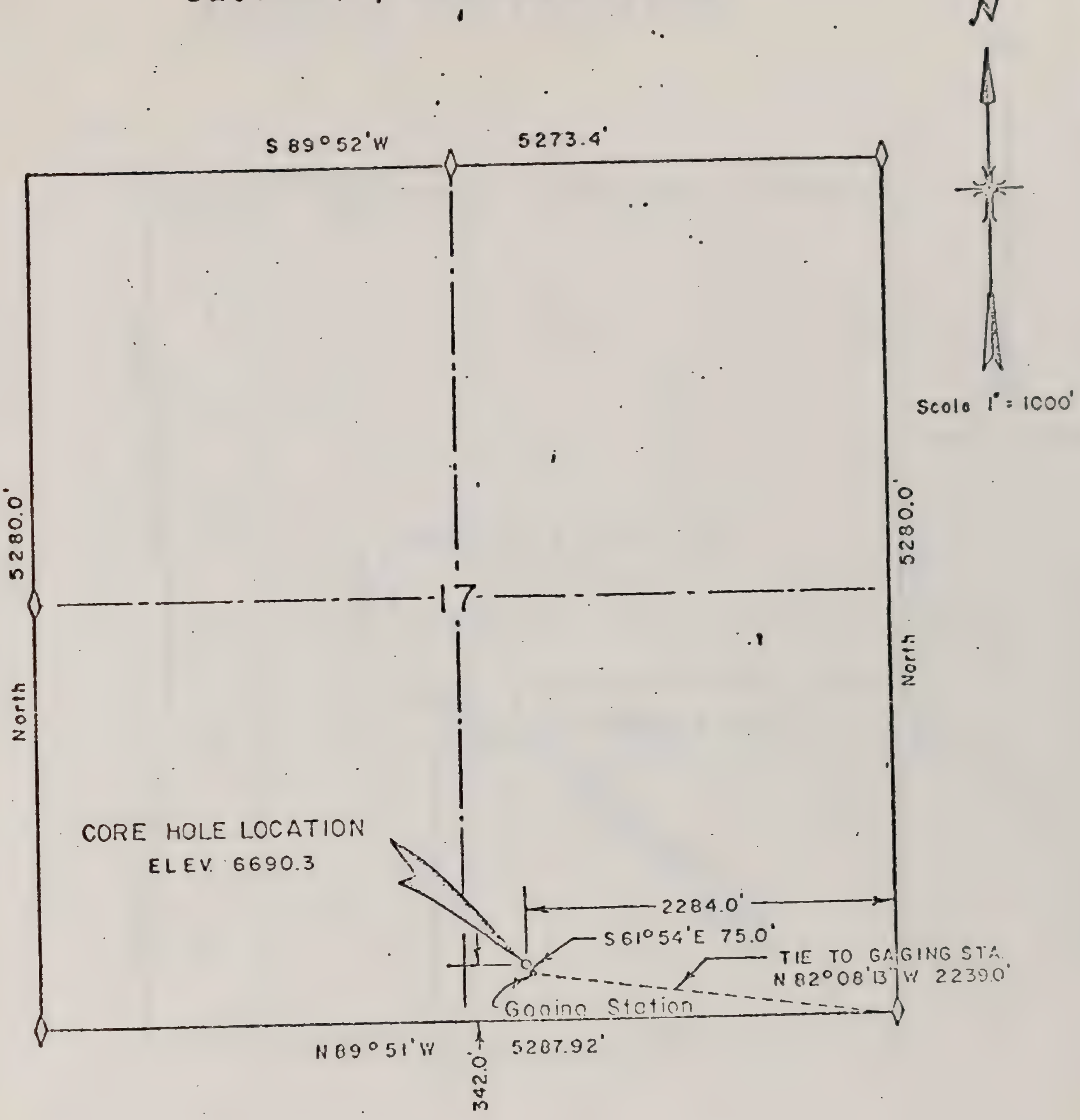
I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 25, 1974.

Clarence J. Bielak
Registered Land Surveyor

II B-40

WESTERN ENGINEERS, INC
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A-11
RIO BLANCO COUNTY, COLOR
SURVEYED C J B DRAWN [illegible]
GRAND JUNCTION, COLO.

CORE HOLE LOCATION
342.0 FT. N.S.L.– 2284.0 FT. W.E.L.
SECTION 17, T 3 S R 96 W 6 TH. P.M.


N
Scale 1" = 1000'
S 89°52'W
5273.4'
5280.0'
North
5280.0'
North
17
CORE HOLE LOCATION
ELEV. 6690.3
2284.0'
S 61°54'E 75.0'
TIE TO GAGING STA.
N 82°08'B'W 2239.0'
Gaging Station
N 89°51'W
5287.92'
342.0'

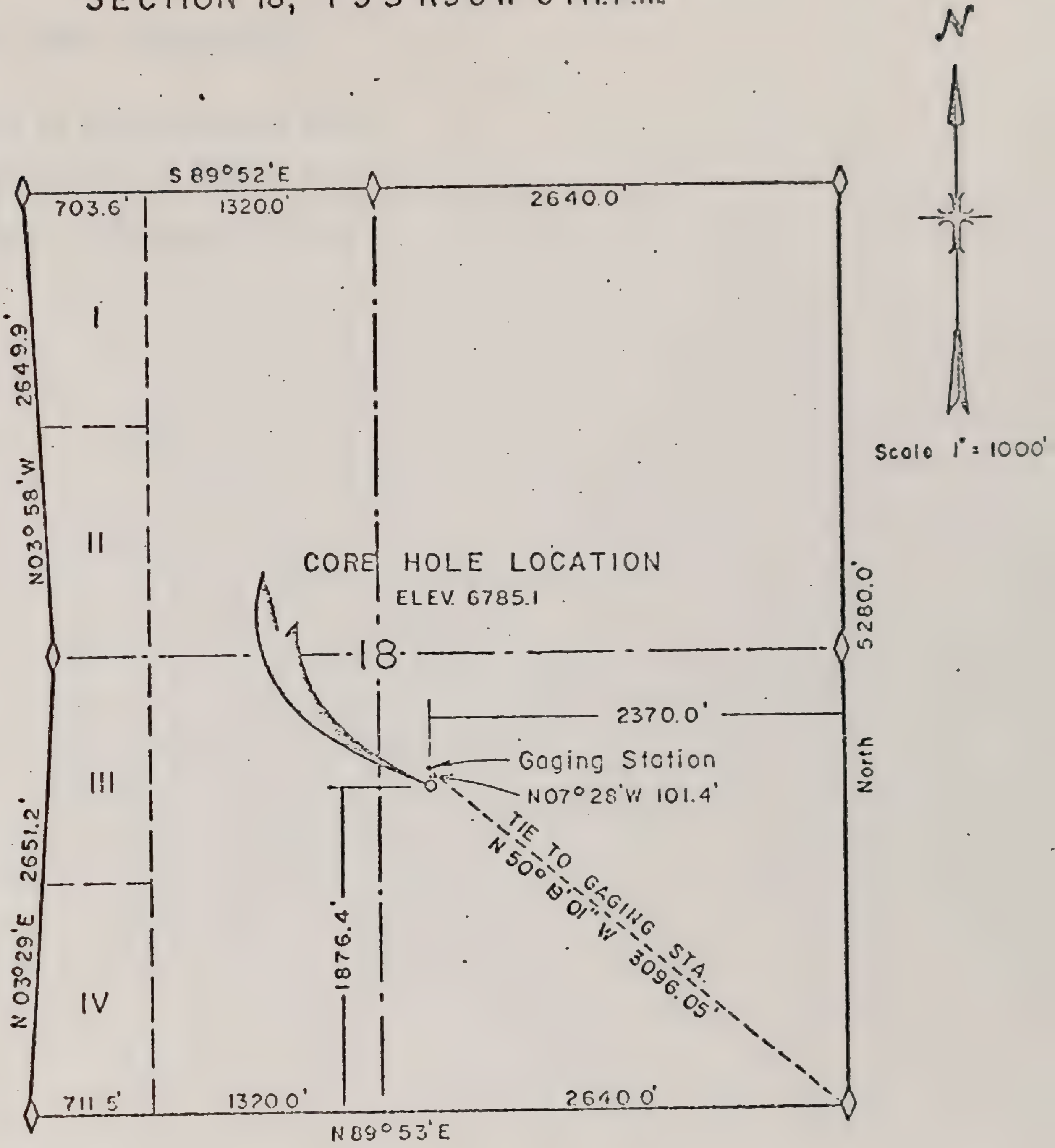
NOTE: Elevation refered to U.S.G.S. datum.

I, Clarence J. Bielak do hereby certify that this plat was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 25, 1974.

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, INC
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A-12
RIO BLANCO COUNTY, COLO
SURVEYED CJB DRAWN JL
GRAND JUNCTION, COLO. [illegible]

CORE HOLE LOCATION
1876.4 FT. N.S.L.— 2370.0 FT. W.E.L.
SECTION 18, T 3 S R96W 6TH.P.M.


N
Scale 1" = 1000'
S 89°52'E
703.6'
1320.0'
2640.0'
N03° 58' W 2649.9'
I
II
III
IV
N 03°29' E 2651.2'
CORE HOLE LOCATION
ELEV. 6785.1
18
5280.0'
North
2370.0'
Gaging Station
N07°28'W 101.4'
TIE TO GAGING STA.
N 50° 8' 01" W 3096.05'
1876.4'
711.5'
1320.0'
2640.0'
N 89°53'E

NOTE: Elevation refered to U.S.G.S. datum.

I, Clarence J. Bielak do hereby certify that this plot was plotted from notes of a field survey made under my direct responsibility, supervision and checking on July 25, 19 74.

Clarence J. Bielak
Registered Land Surveyor

WESTERN ENGINEERS, IN
CORE HOLE LOCATION
ATLANTIC RICHFIELD
A –13
RIO BLANCO COUNTY COLOR
SURVEYED C.J.B. DRAWN
GRAND JUNCTION, COLO.

Additional survey information:

SG-18a is 10 feet west of SG-18

SG-10a is 10 feet west of SG-10

Cb-2b is 32 feet south of Cb-2

TABLE II B-3

Well Completion Data

The following is a list of those wells on which well completion data has been finalized. A schematic of the completion data on each well follows in this section.

Aquifer Test Wells
AT-1
AT-1a
AT-1a1
AT-1b
AT-1c
AT-1d

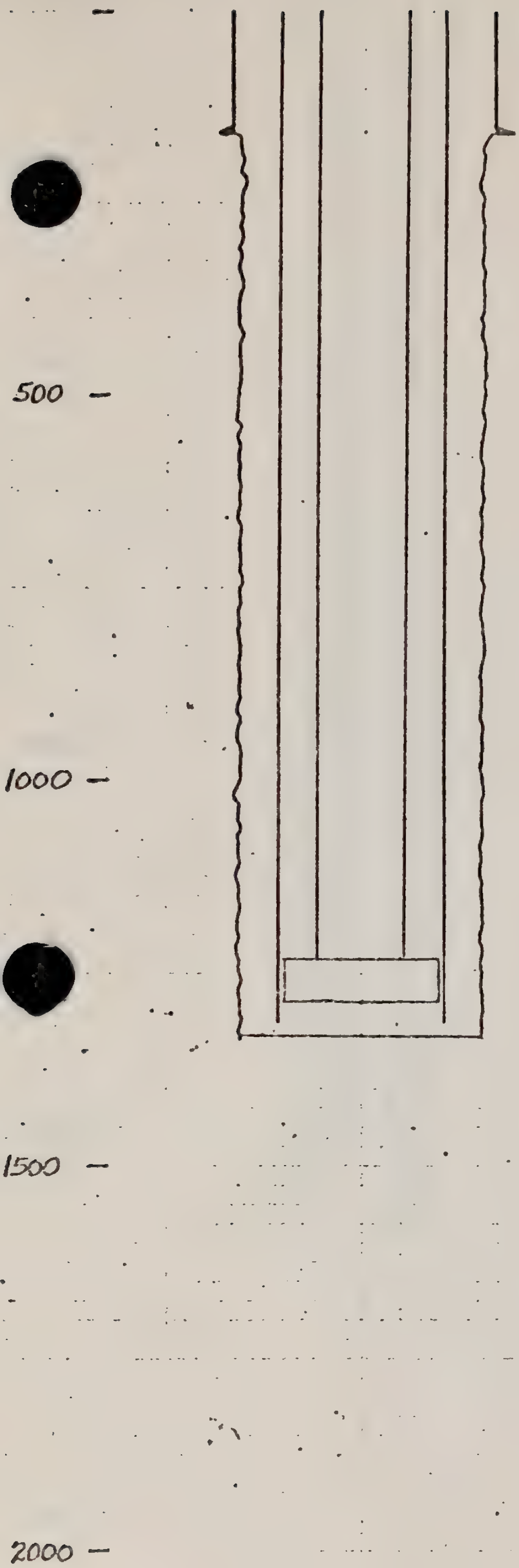
Alluvial Wells
A-1
A-2
A-3
A-4
A-5
A-6
A-7
A-8
A-9
A-10
A-11
A-12
A-13

Deep Coreholes and Wells
*SG-6
SG-9
*SG-10
*SG-10a
*SG-11
SG-18 (abandoned)
SG-18a
SG-19
Cb-2b (abandoned)

Existing Open Coreholes
Cb-1
Cb-2
Cb-3
Cb-4

* Also used as outer observation wells for Aquifer Pump Tests.

AT-1
C-b Tract
Section 7, T3S, R96W



13-3/8" @ 157' cemented to surface

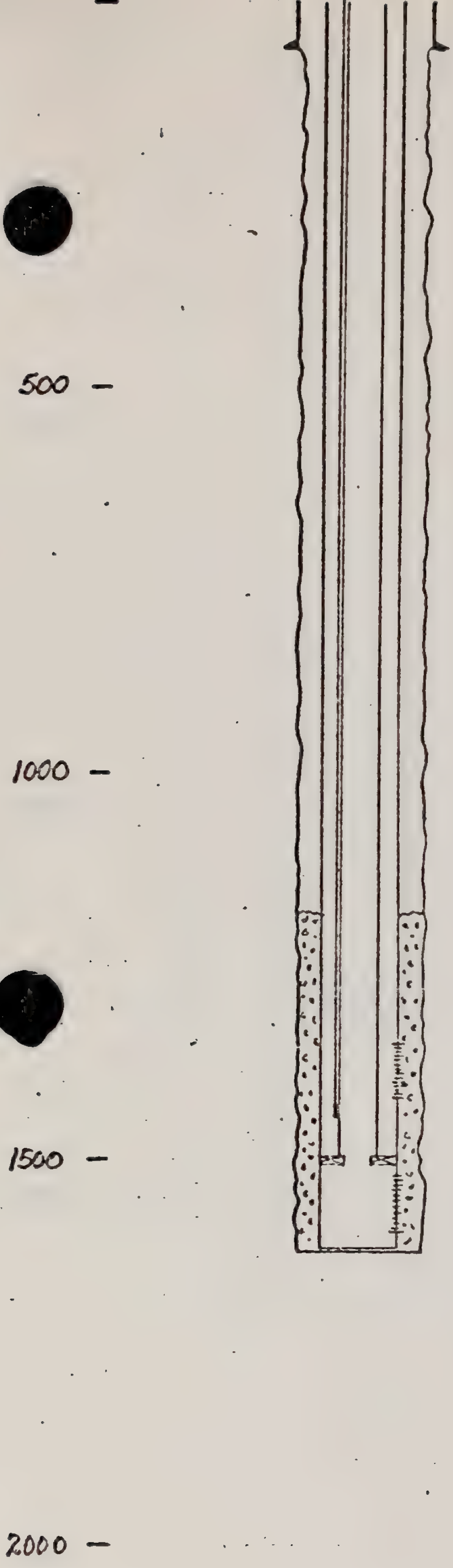
4½" casing w/ Reda Pump Assembly and Sperry Sun Permagage ~~Hung @ 1317'~~ above pump

8-5/8" casing hung @ 1315' w/ bottom 257' slotted

12-¼" hole to 1330'

C.E.R. 11-20-74

AT-1A
C-b Tract
Section 7, T3S, R96W



7" @ 65' CEMENTED TO SURFACE

4" CASING @ 1620' CEMENTED w/ 110 SX. CLASS "G" w/ 2% $CaCl_2$.
CEMENT TOP BY LOG - 1178'

PERFORATIONS w/ 2" SIDEWINDER GUN @ 2 SHOTS/FOOT
1350 TO 1420 AND 1520 TO 1590

SPERRY SUN 0.84" O.D. PERMAGAGE IN ANNULUS @ 1446'

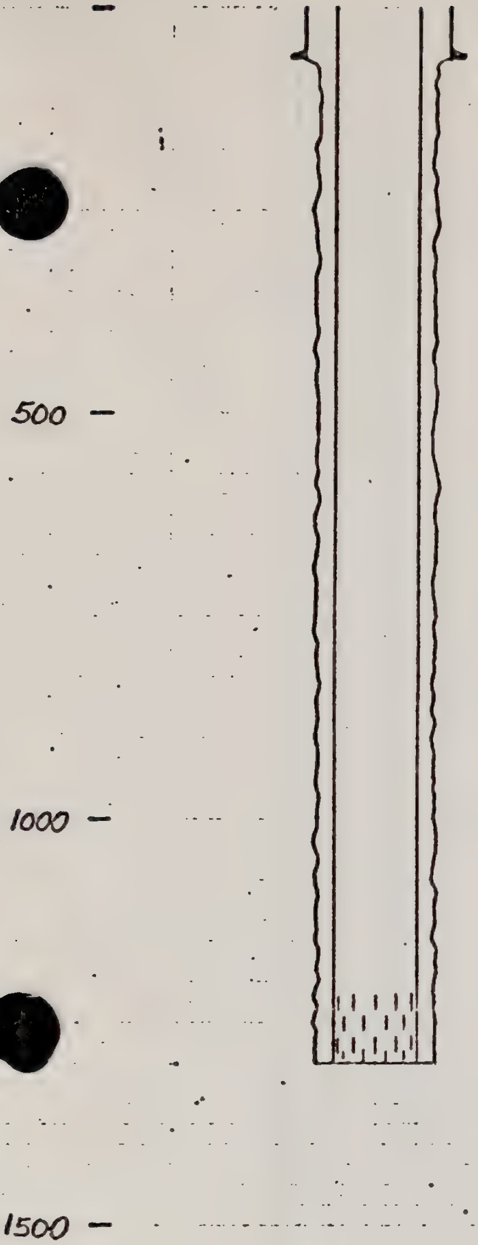
4" - "GO" MODEL DGLF PRODUCTION PACKER @ 1500'

2" - WHEELING-PITTSBURGH - 8 ACME TUBING w/ "GO" DGLF SEAL ASSEMBLY @ 15

6-1/4" HOLE TO 1620'

C.L.R.
10-30-74

AT-1A1
C-b Tract
Section 7, T3S, R96W



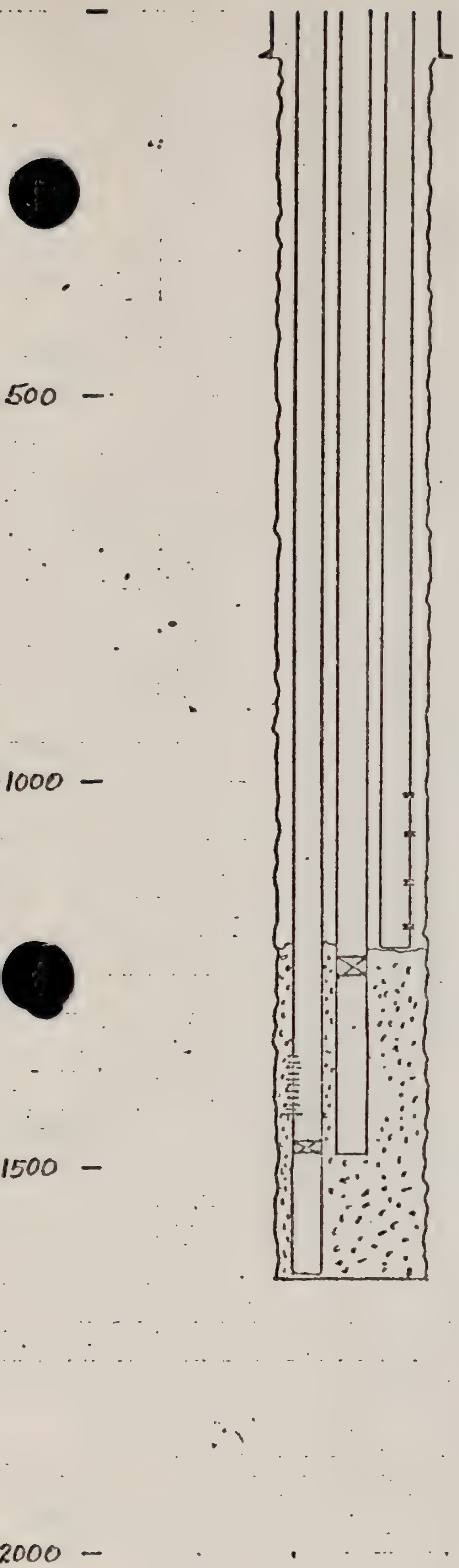
7" @ 65' CEMENTED TO SURFACE

4" CASING SET ON BOTTOM @ 1300' w/ BOTTOM 4 JOINTS (84') SLOTTED

5-7/8" HOLE TO 1300'

C.E.R
10-30-74

AT-1B
C-b Tract
Section 7, T3S, R96W



8-5/8" @ 60' CEMENTED TO SURFACE

#1 STRING 2-3/8" EUE TO 1636' PBTD 1633'

#2 STRING 2-3/8" EUE TO 1456'

#3 STRING 2-3/8" EUE TO 1217'

CEMENTED 7-22-74 W/ 220 SX CLASS "G" W/ 6% GEL
CEMENT TOP FROM LOG - 1226' W/ STRINGERS TO 1200' ON #1 STRING
- 1234' ON #2 STRING

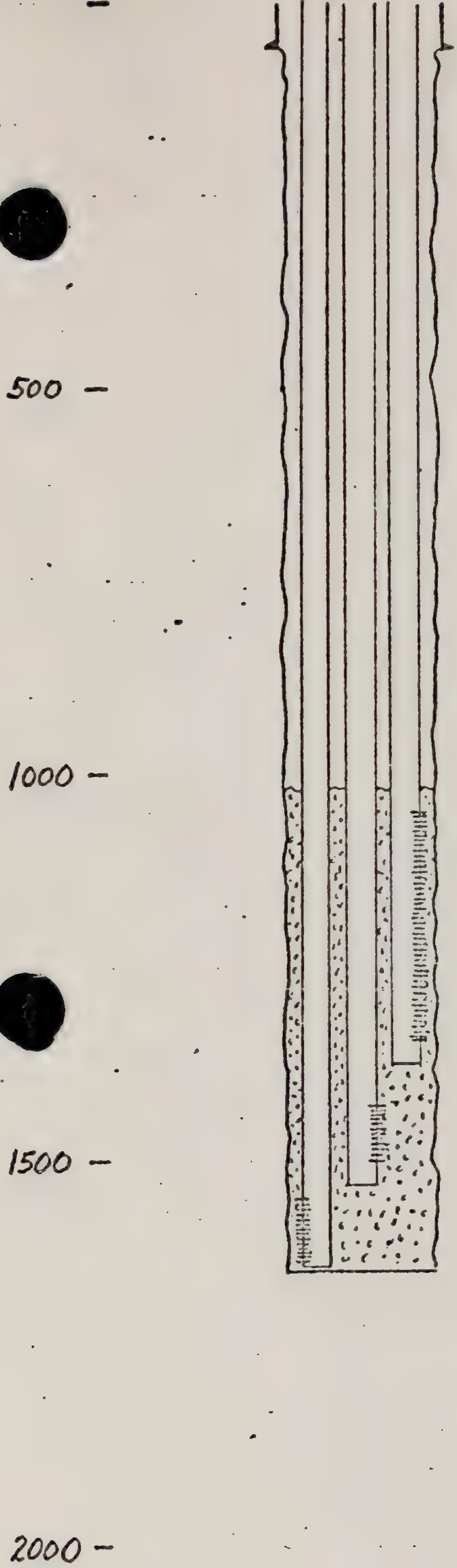
PERFORATIONS

#1 STRING - 1360 TO 1430
#2 STRING - ABANDON STRING
#3 STRING - 1015 TO 1215 (2 SHOTS @ 1015-16; 1067-68; 1127-28; & 1187-88)

7-7/8" HOLE TO 1638'

C.E.R.
11-20-74

AT-1C
C-b Tract
Section 7, T3S, R96W



8-5/8" @ 60' CEMENTED TO SURFACE

#1 STRING 2-3/8" EUE TO 1644' PBTD 1639'

#2 STRING 2-3/8" EUE TO 1529'

#3 STRING 2-3/8" EUE TO 1375'

CEMENTED 9-11-74 w/ 120 SX HOWCO LIGHT + 10#/SX GILSONITE + 0.3% LW

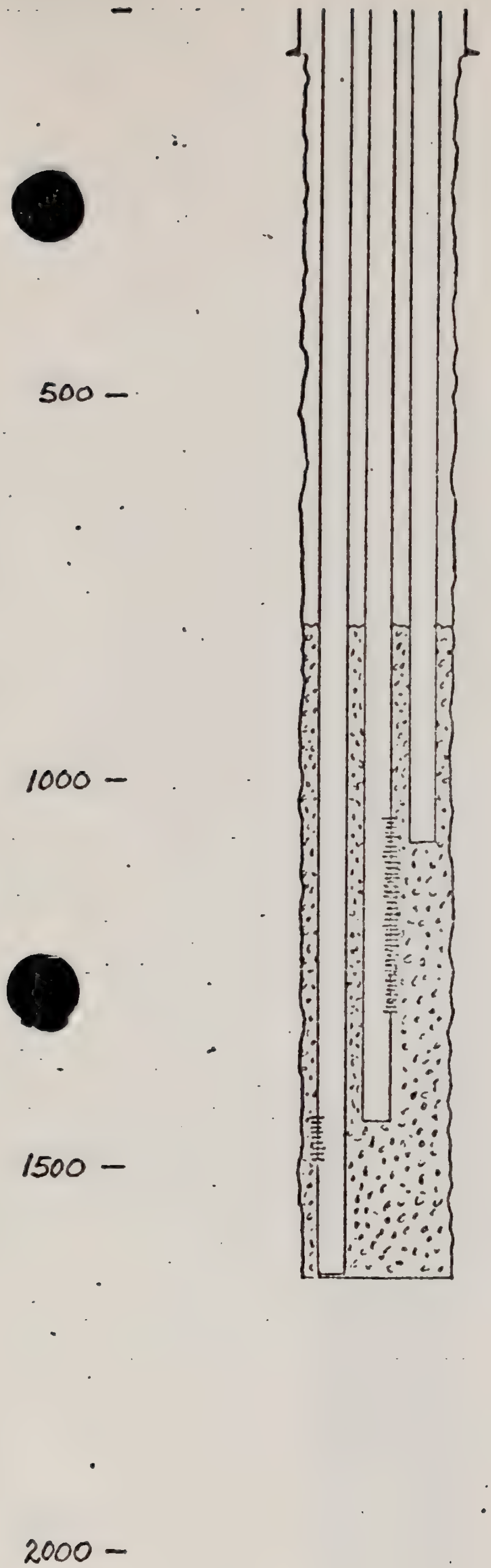
CEMENT TOP FROM LOG - #1 STRING - 1022'
#2 STRING - 1024'
#3 STRING - 1024'

PERFORATIONS w/ 1-9/16" HYPER JETS @ 1 SHOT/FOOT

#1 STRING - 1550 TO 1635
#2 STRING - 1430 TO 1500
#3 STRING - 1050 TO 1340

7-7/8" HOLE TO 1646'

C.E.R.
11-20-74



8-5/8" @ 60' CEMENTED TO SURFACE

AT-1D
C-b Tract
Section 7, T3S, R96W

#1 STRING 2-3/8" EUE TO 1640' PBTD - 1635'

#2 STRING 2-3/8" EUE TO 1441'

#3 STRING 2-3/8" EUE TO 1079'

CEMENTED 8-2-74 W/ 150 SX HOWCO LIGHT + 10#/SX GILSONITE

CEMENT TOP FROM LOG - #1 STRING - 797'
#2 STRING - 805' W/ STRINGER 799-802

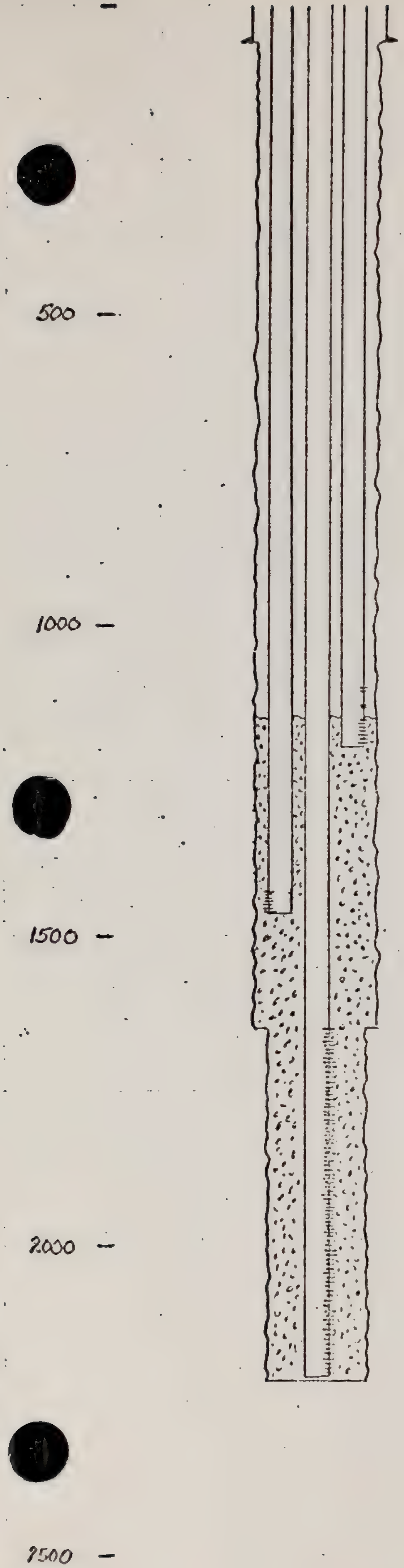
PERFORATIONS

#1 STRING 1435 TO 1480
#2 STRING 1050 TO 1300
#3 STRING WILL NOT BE USED

7-7/8" HOLE TO 1640'

C.E.R
10-30-74

SG-6
C-b Tract
Section 7, T3S, R96W



8-5/8" @ 60' CEMENTED TO SURFACE

#1 STRING 2-3/8" EUE TO 2216' PBTD - 2210'
#2 STRING 2-3/8" EUE TO 1466' (1474' SCHLUMBERGER)
#3 STRING 2-3/8" EUE TO 1194'

CEMENTED 8-27-74 w/ 210 SX HOWCO LIGHT + 10#/SX GILSONITE

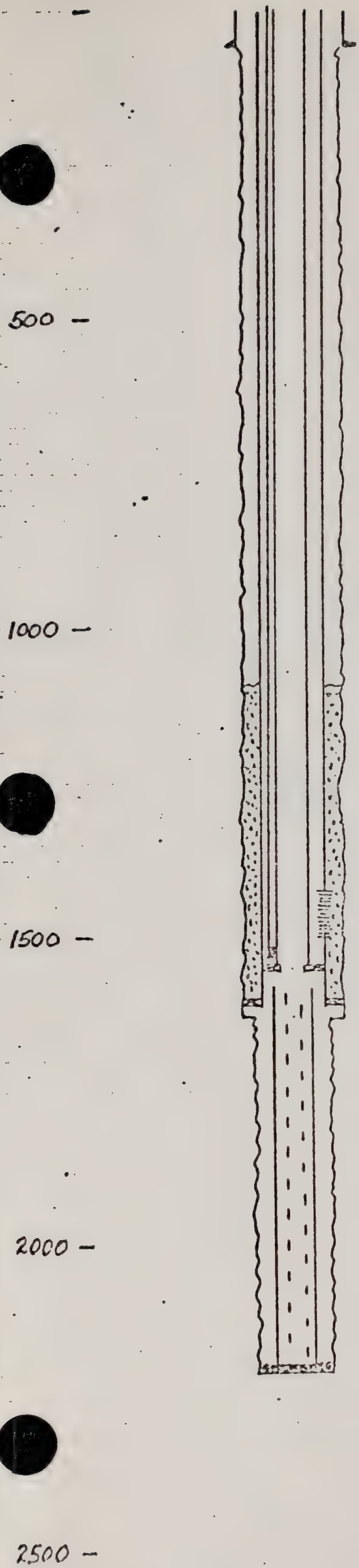
CEMENT TOP BY LOG - #1 STRING 1150'
#2 STRING

PERFORATIONS - 1-9/16" HYPER JETS @ 1 SHOT/FOOT
#1 STRING - 1625 - 2208
#2 STRING - 1430 - 1470
#3 STRING - 1100-01 ; 1130-31 ; 1150-1193

7-7/8" HOLE TO 1650'

6-1/4" HOLE TO 2220'

C.E.R.
10-30-74



7" @ 65' CEMENTED TO SURFACE

SG-10
C-b Tract
Section 13, T3S, R97W

4" CASING w/ HOWCO PACKER SHOE @ 1603'
CEMENTED w/ 40 sx CLASS "G" w/ 2% $CaCl_2$
CEMENT TOP BY LOG @ 1410'
PERFORATE 1400-1402' w/ 4 SHOTS FOR SQUEEZE
SQUEEZED w/ 125 sx CLASS "G" - PRESSURE TESTED TO 750 P.S.I. O.K.
CEMENT TOP NOW 1090' BY LOG.

PERFORATIONS 1425-1500' w/ 2 SHOTS/FOOT

SPERRY SUN 0.84" O.D. PERMAGAGE IN ANNULUS @ 1518'

4" - "60" MODEL DGLF PRODUCTION PACKER @ 1550'

2" - WHEELING-PITTSBURGH - 8 ACME TUBING w/ "60" DGLF SEAL ASSEMBLY @ 155

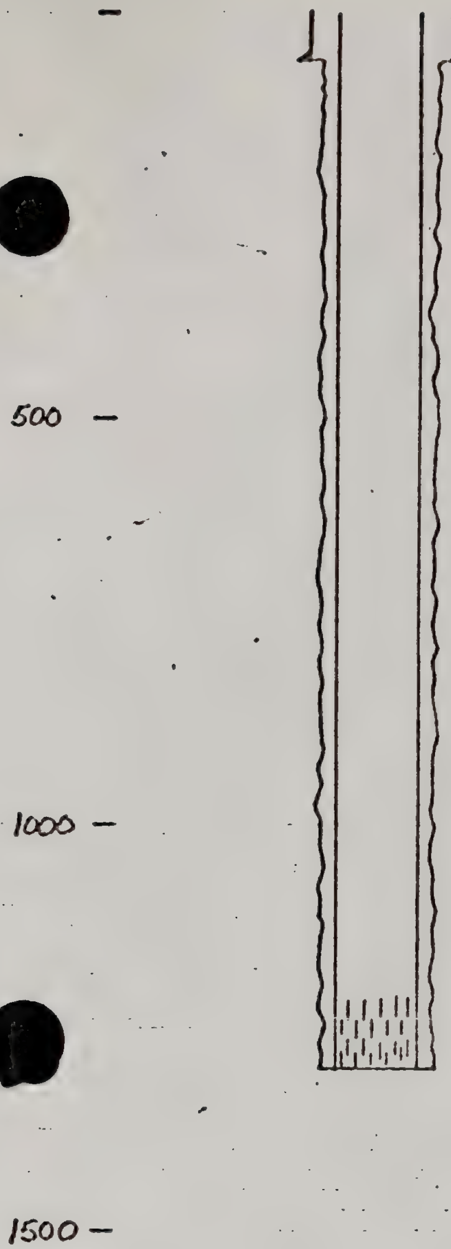
6-1/4" HOLE TO 1630'

2-3/8" EUE SET AS LINER IN OPEN HOLE 1576-2190' w/ 2 SLOTS TOP AND BOTTOM EVERY JOINT CUT w/ TORCH.

4-7/8" HOLE TO 2211' - COTD 2190'

C.E.R.
10-30-74

SG-10A
C-b Tract
Section 13, T3S, R97W

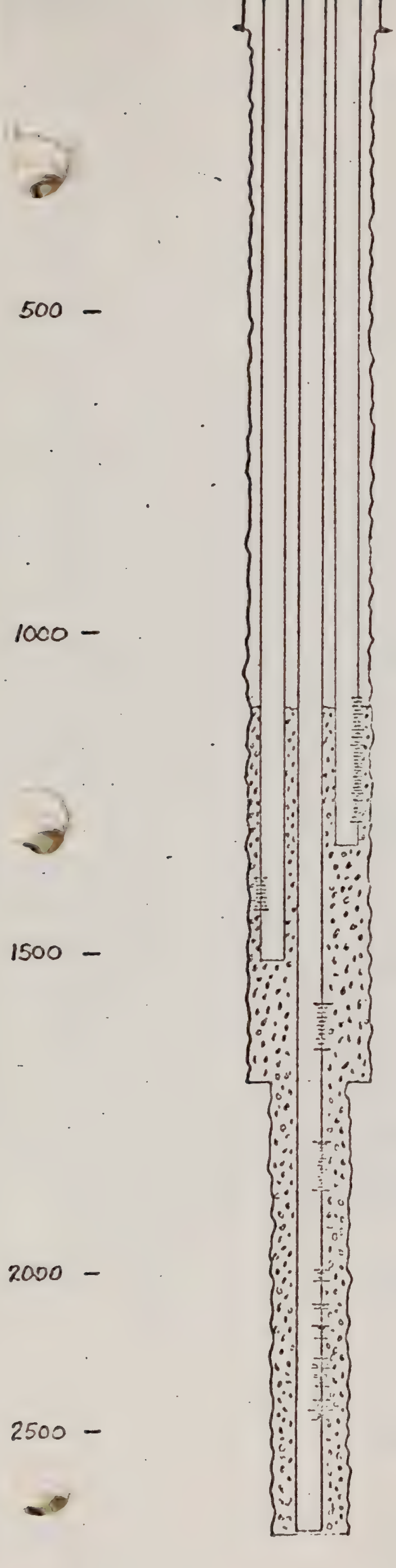


7" @ 60' CEMENTED TO SURFACE

4" CASING SET ON BOTTOM @ 1300' w/ BOTTOM 4 JOINTS (84') SLOTTED.

5-7/8" HOLE TO 1300'

C.E.P.
10-30-74



8-5/8" @ 60' CEMENTED TO SURFACE

SG-11
C-b Tract
Section 7, T3S, R96W

#1 STRING TO 2820' PBTD 2813'

#2 STRING TO 1511'

#3 STRING TO 1327'

CEMENTED 9-14-74 w/ 230 SX HOWCO LIGHT + 10#/SX GILSONITE + 0.3% L

CEMENT TOP BY LOG - 1120

PERFORATIONS

#1 STRING 1580-1650, 1790-1870, 1995-2024; 2100-05, 2170-2205, 2270-90, 2300-15, 2325-60, 2400-20, 2435-60 } 2 SHOT/FT

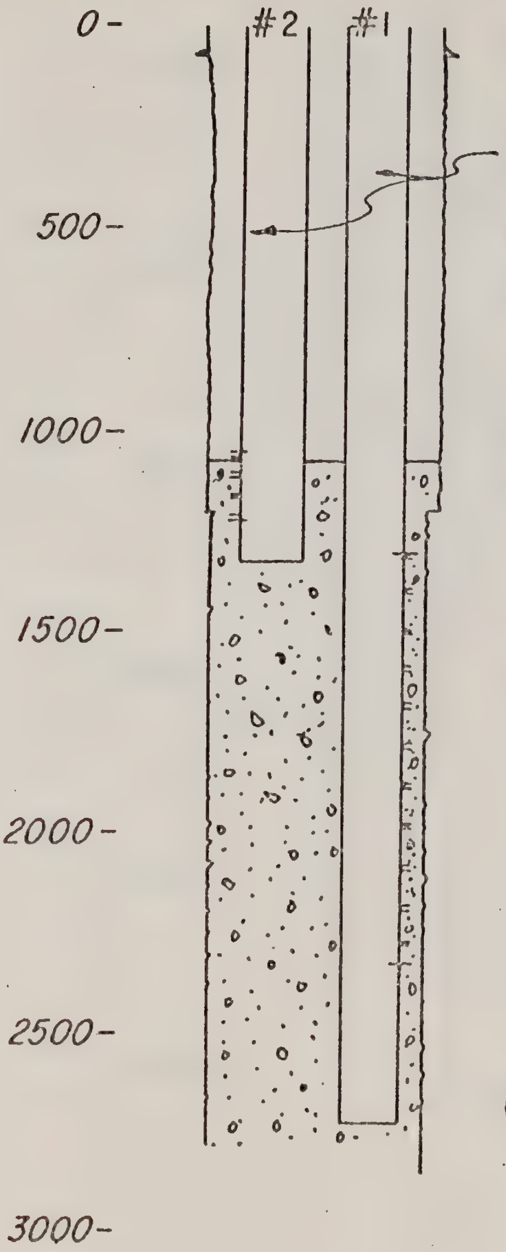
#2 STRING - 1385 - 1435' 1-9/16" HYPER JETS @ 1 SHOT/FOOT
#3 STRING - 1100 - 1290 1-9/16" HYPER JETS @ 1 SHOT/FOOT

7-7/8" HOLE TO 1703'

4-7/8" HOLE TO 2826'

C.E.R.
10-30-74

SG - 9
C-b Tract
Section II, T3S, R 97 W


0-
500-
1000-
1500-
2000-
2500-
3000-
#2
#1

2⅜" tubing

8⅝" at 65' Cemented to surface

#1 String landed at 2732'

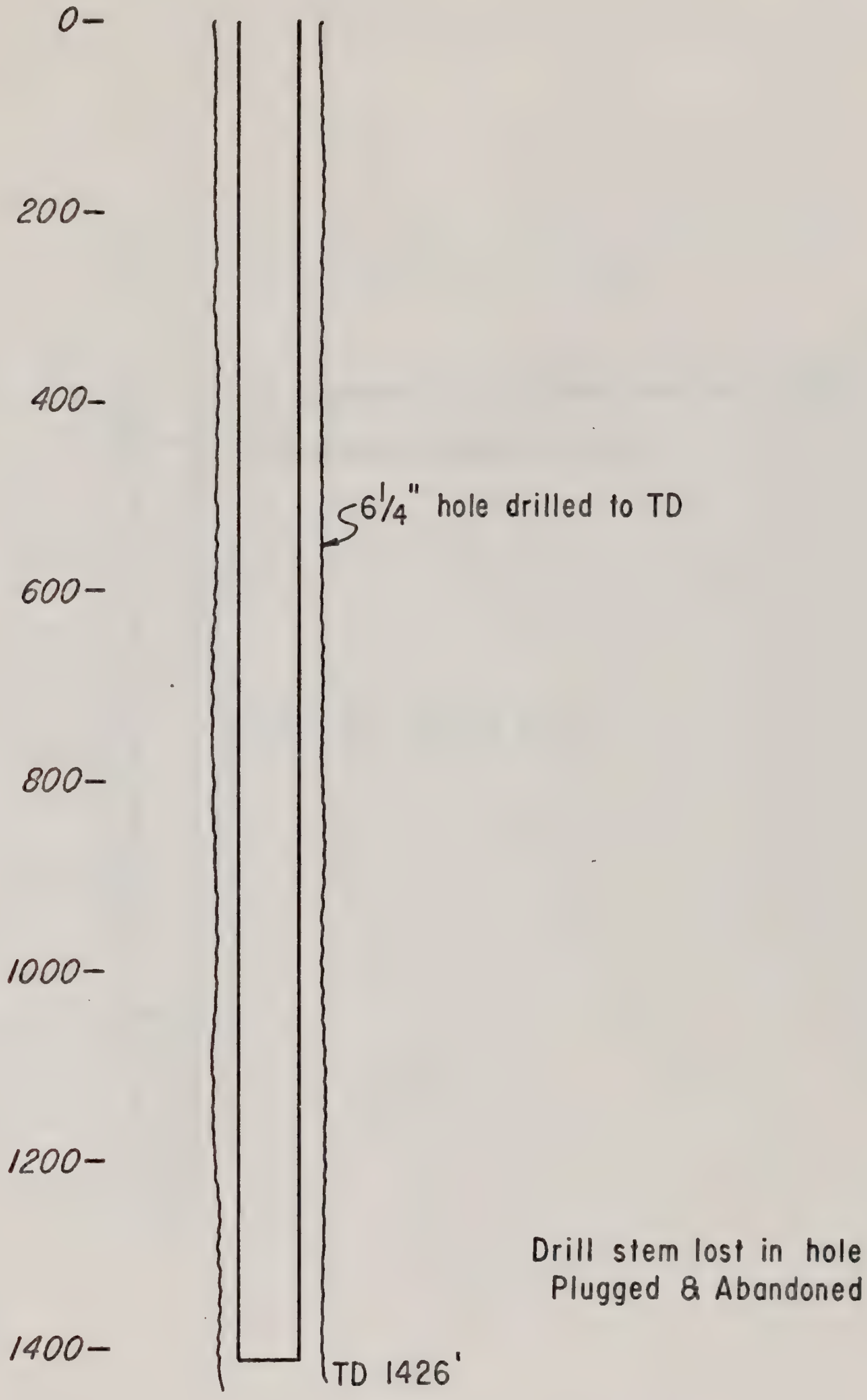
#2 String to 1338'

Cement top at 1074'

Perforations:
#1 String 1316' - 2324'
#2 String 1054' - 1210'

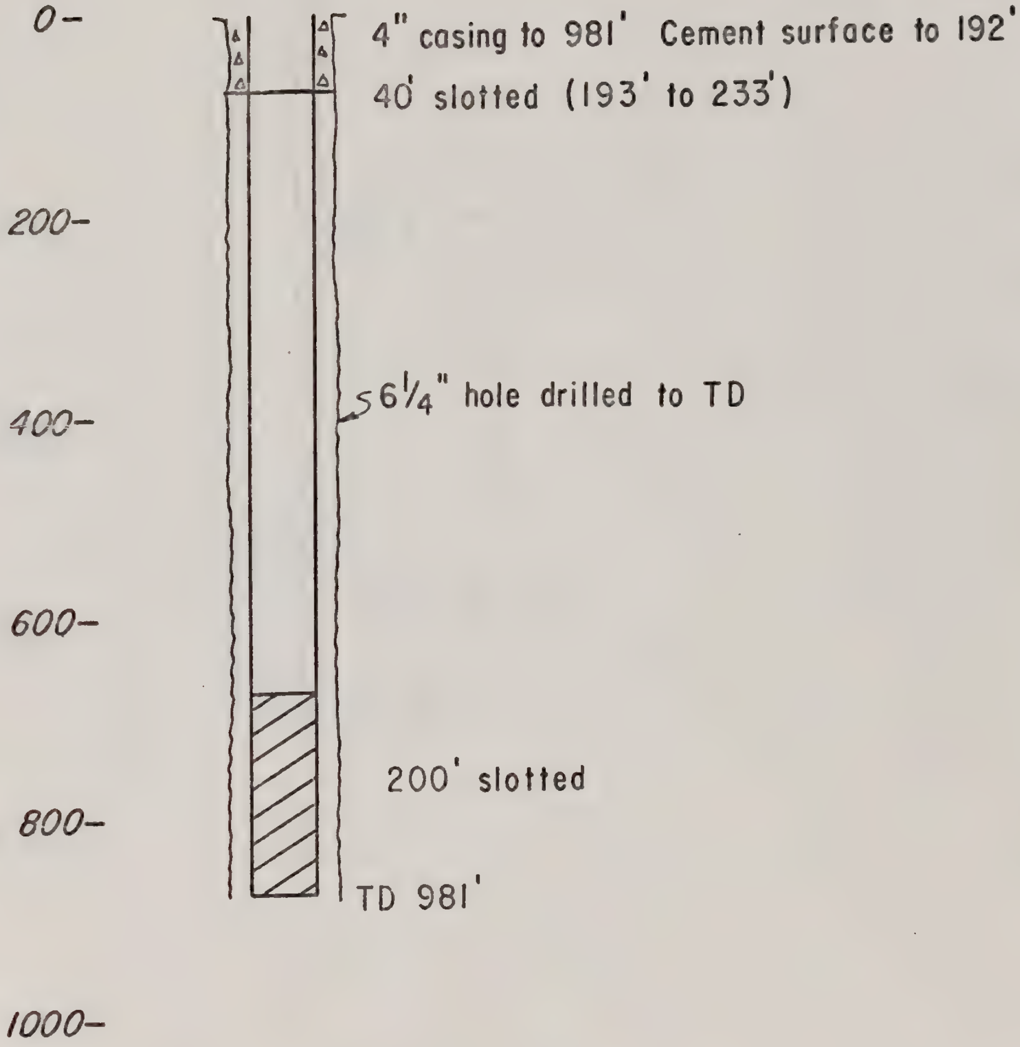
7⅞" hole to 1200'

6¾" hole to 2750' TD


0
200
400
600
800
1000
1200
1400
6¼" hole drilled to TD
TD 1426'

Drill stem lost in hole
Plugged & Abandoned

SG-18
C-b TRACT
Section 25, T3S, R97W

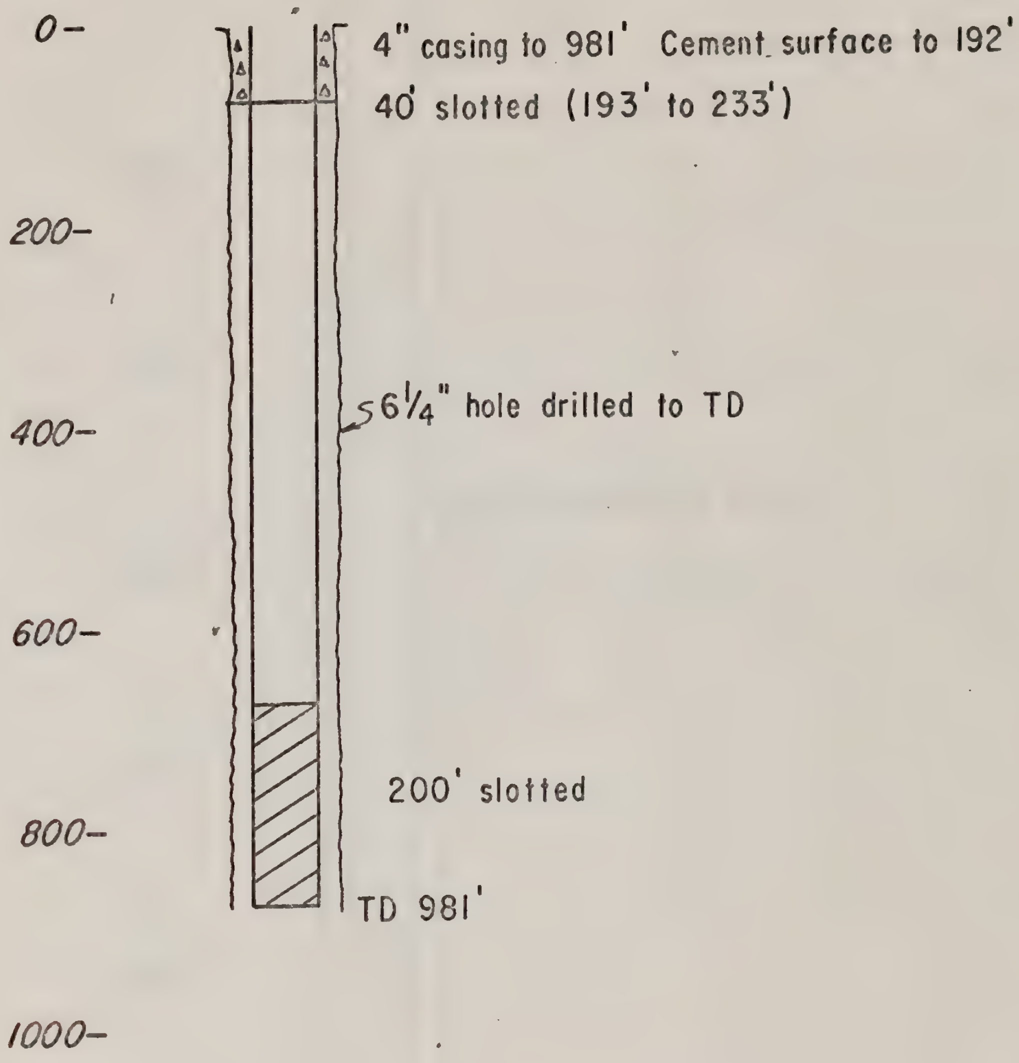


0-
200-
400-
600-
800-
1000-
4" casing to 981' Cement surface to 192'
40' slotted (193' to 233')
6¼" hole drilled to TD
200' slotted
TD 981'

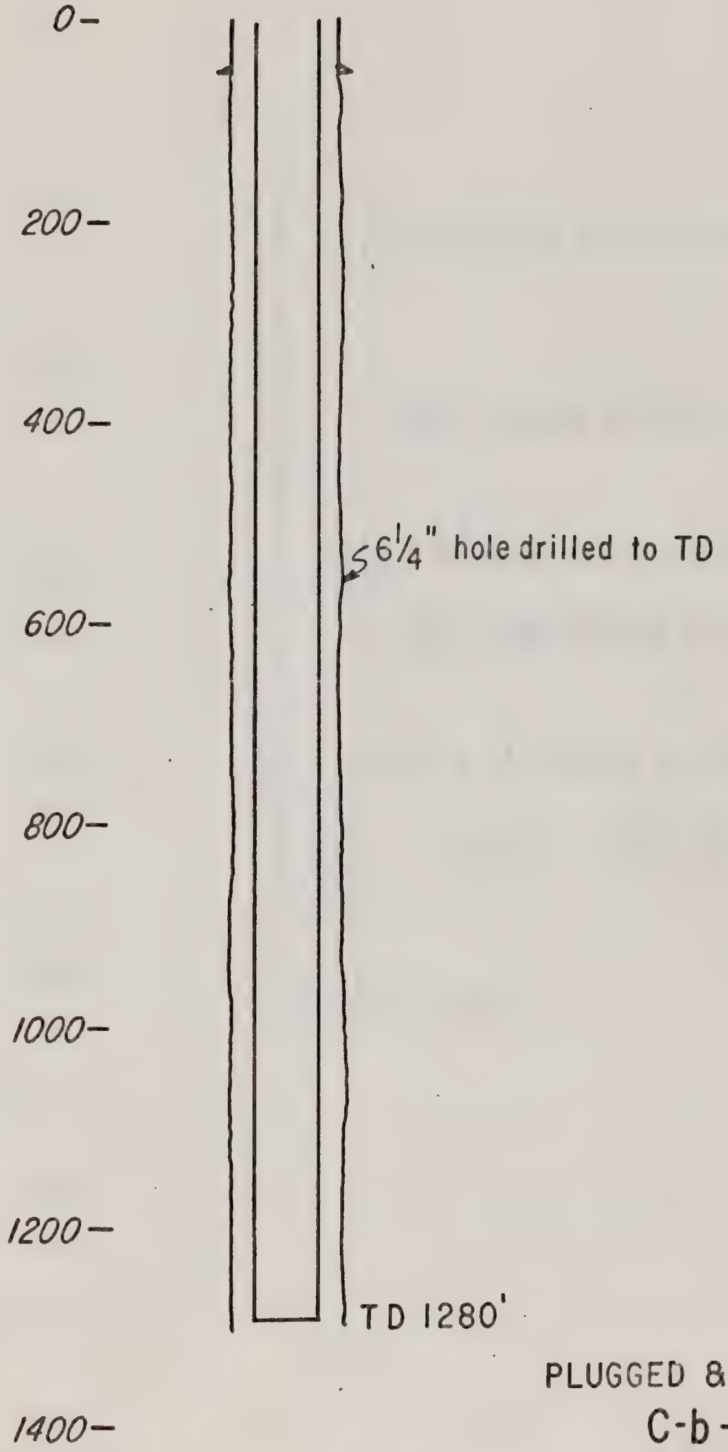
SG-19

C-b TRACT

Section 5, T 3 S, R 96 W


0-
200-
400-
600-
800-
1000-
4" casing to 981' Cement surface to 192'
40' slotted (193' to 233')
6¼" hole drilled to TD
200' slotted
TD 981'

SG-19
C-b TRACT
Section 5, T3S, R96W

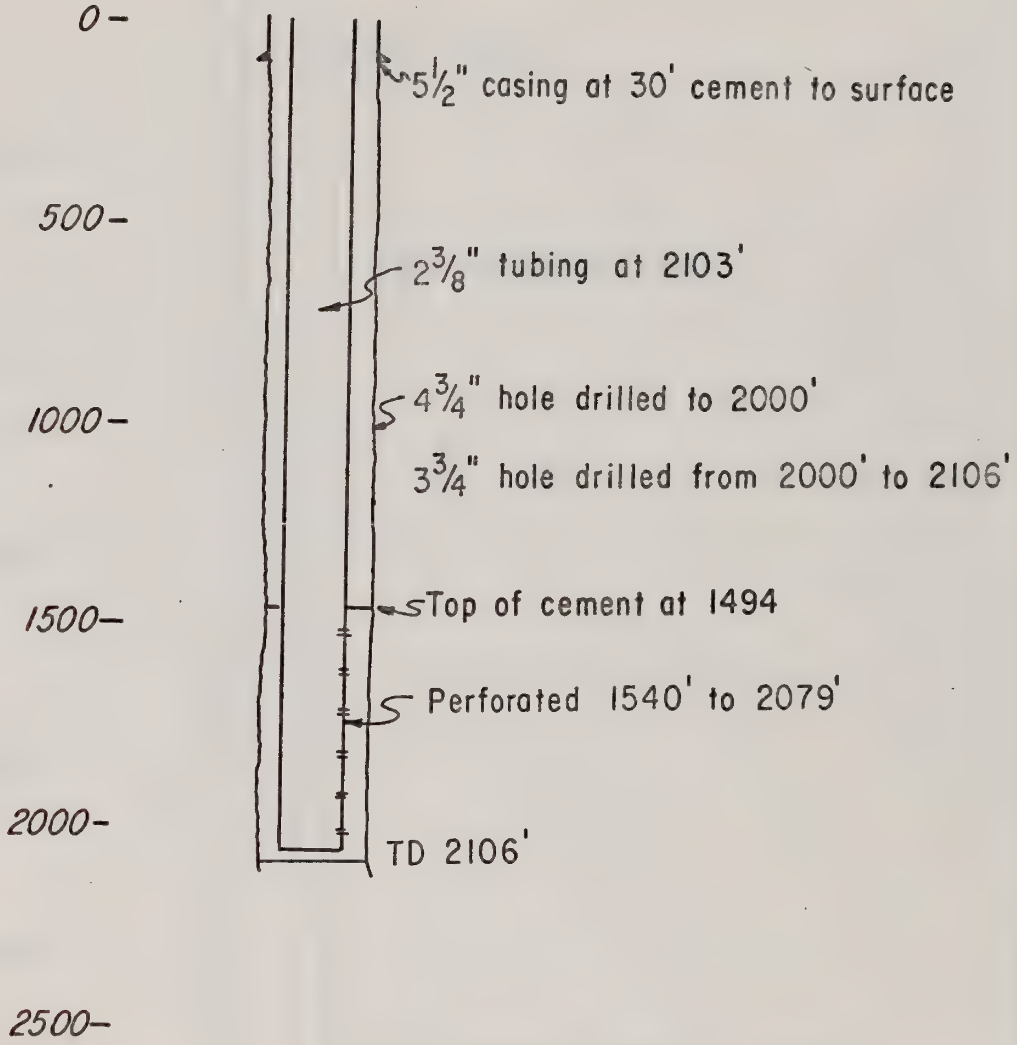

0
200
400
600
800
1000
1200
1400
6¼" hole drilled to TD
TD 1280'

PLUGGED & ABANDONED

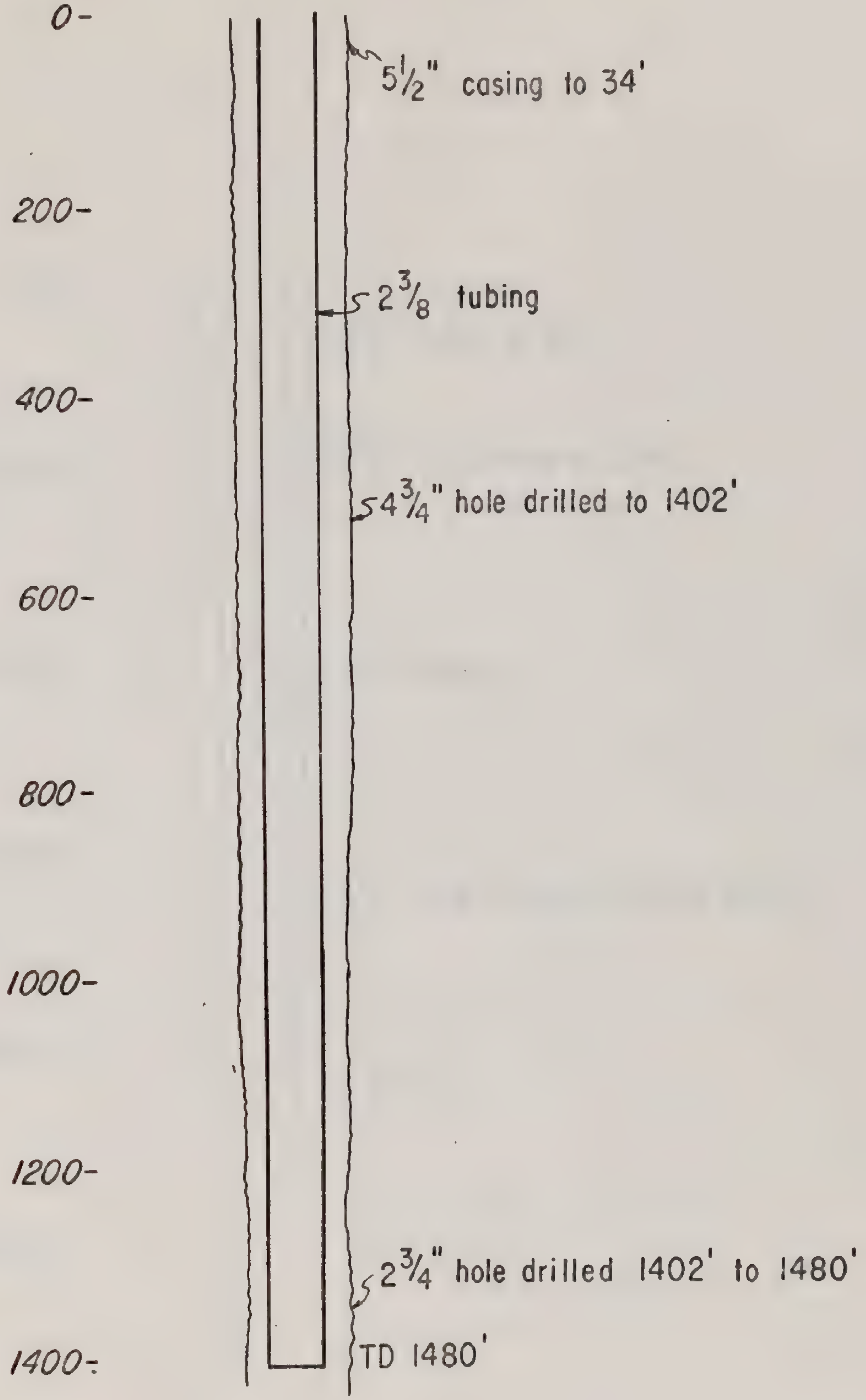
C-b-2b

C-b TRACT

Section 6, T3S, R96W


0-
500-
1000-
1500-
2000-
2500-
5½" casing at 30' cement to surface
2⅜" tubing at 2103'
4¾" hole drilled to 2000'
3¾" hole drilled from 2000' to 2106'
Top of cement at 1494
Perforated 1540' to 2079'
TD 2106'

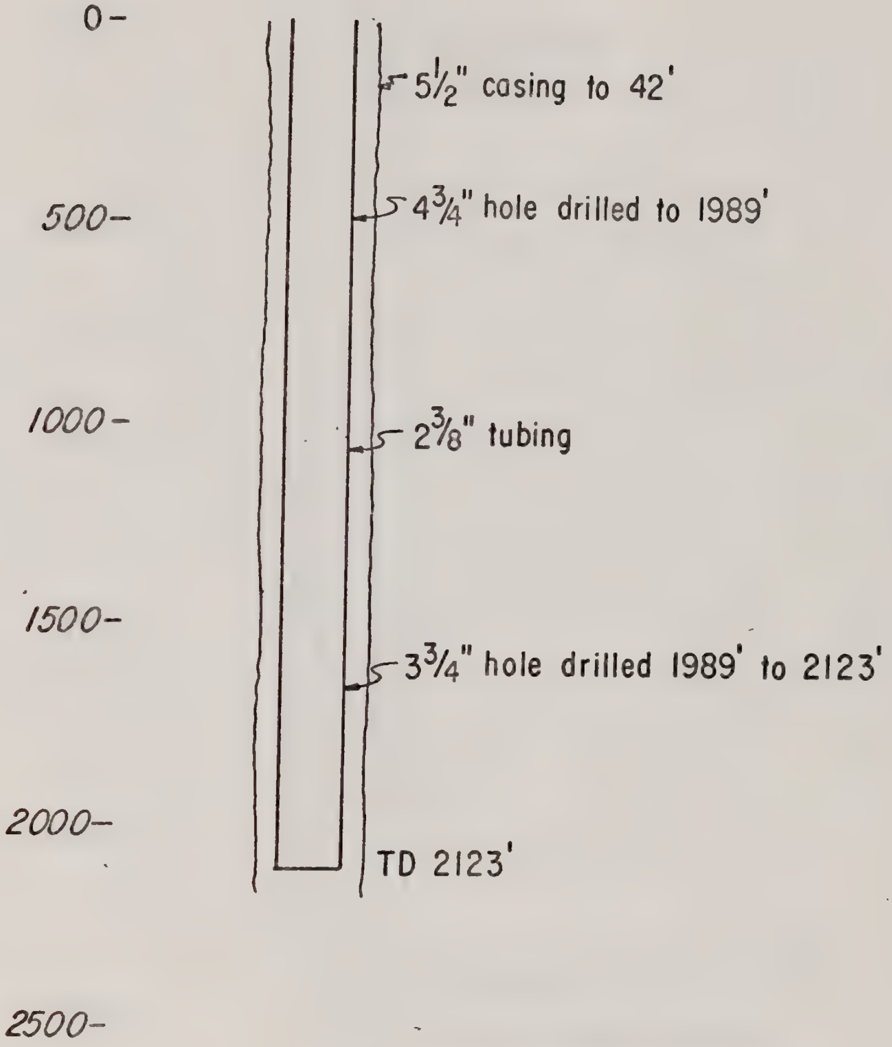
C-b-1
C-b TRACT
Section 1, T3S, R97W


0-
200-
400-
600-
800-
1000-
1200-
1400-
5½" casing to 34'
2⅜ tubing
4¾" hole drilled to 1402'
2¾" hole drilled 1402' to 1480'
TD 1480'

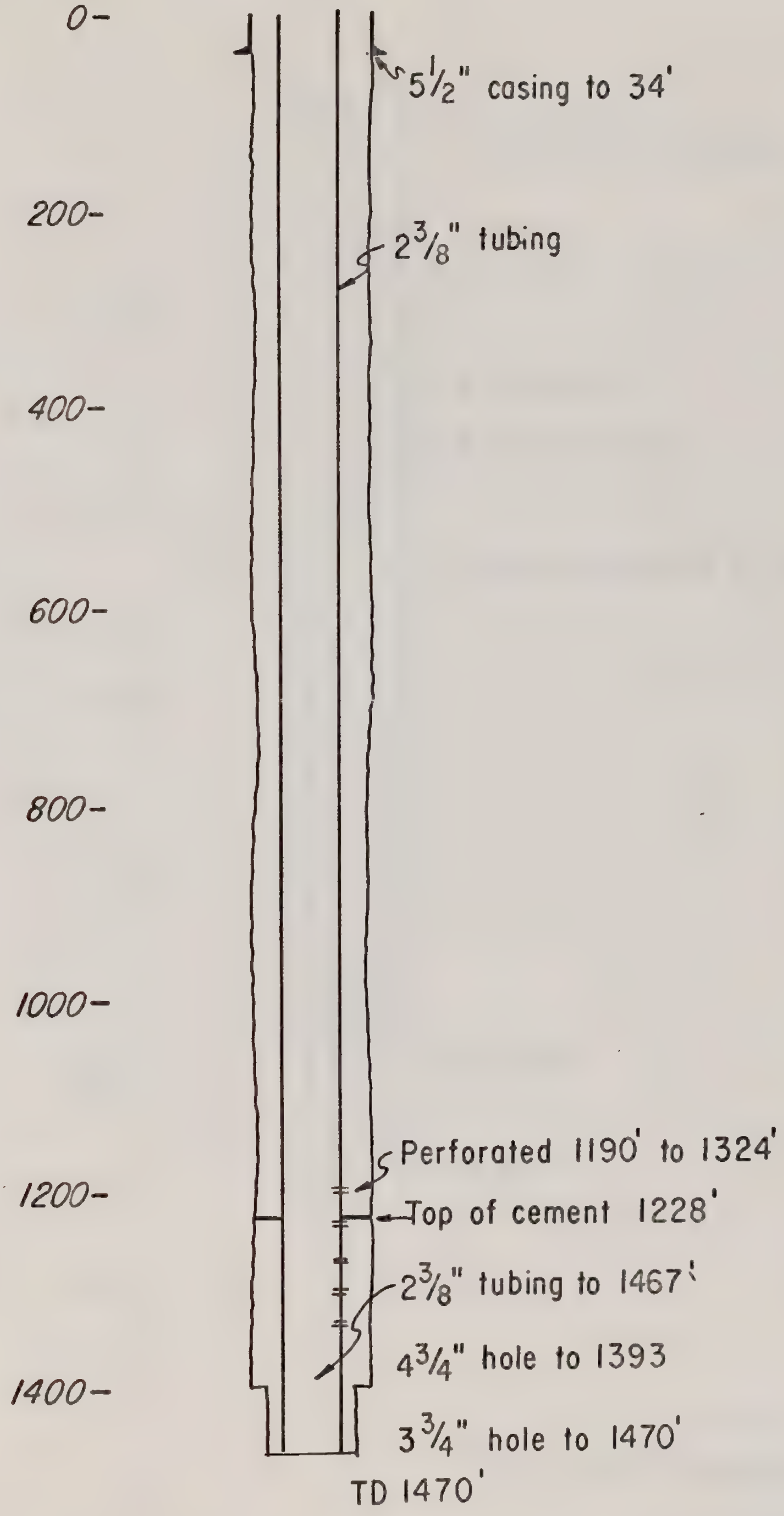
C-b 2

C-b TRACT

Section 6, T3S, R96W


0-
500-
1000-
1500-
2000-
2500-
5½" casing to 42'
4¾" hole drilled to 1989'
2⅜" tubing
3¾" hole drilled 1989' to 2123'
TD 2123'

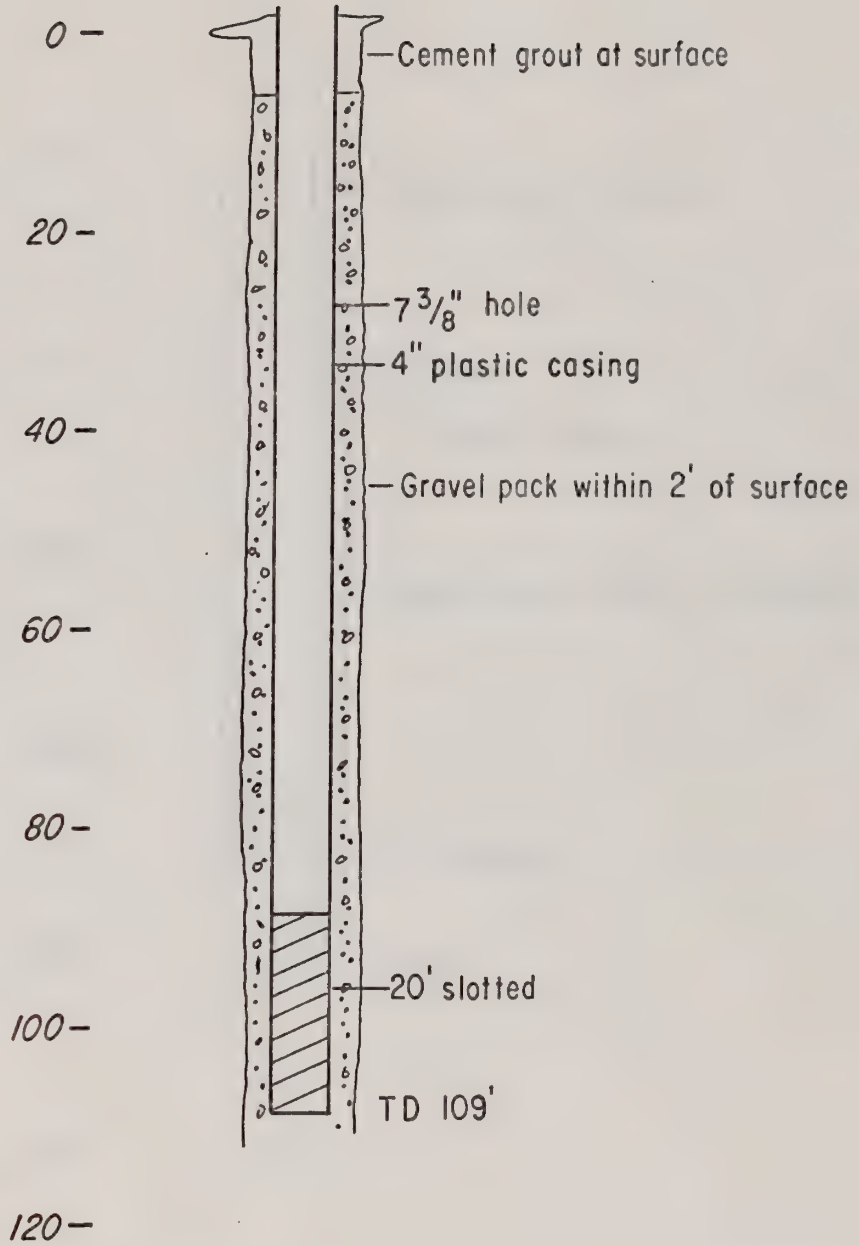
C-b-3
C-b TRACT
Section 5, T3S, R96W


0-
200-
400-
600-
800-
1000-
1200-
1400-
5½" casing to 34'
2⅜" tubing
Perforated 1190' to 1324'
Top of cement 1228'
2⅜" tubing to 1467'
4¾" hole to 1393
3¾" hole to 1470'
TD 1470'

C-b-4

C-b TRACT

Section 17, T3S, R96W

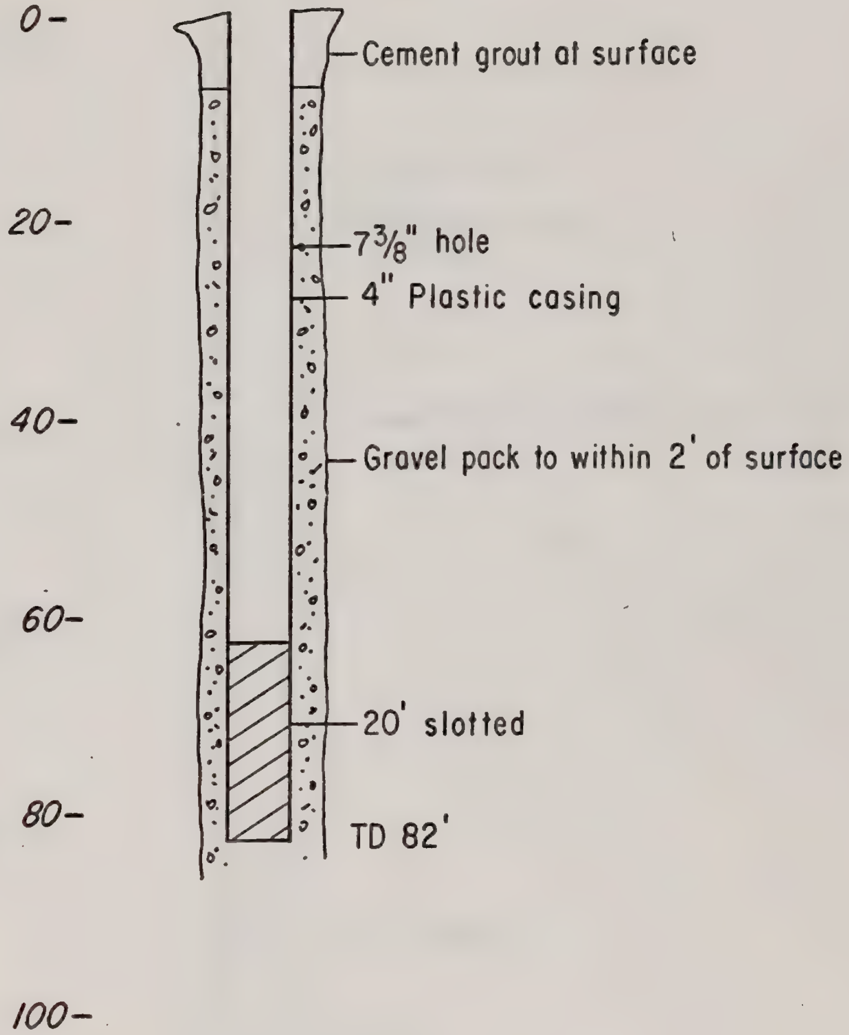

0
20
40
60
80
100
120
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack within 2' of surface
20' slotted
TD 109'

A-1

ALLUVIAL MONITORING WELL

C-b TRACT

SW, SW, Section 25, T2S, R 97 W

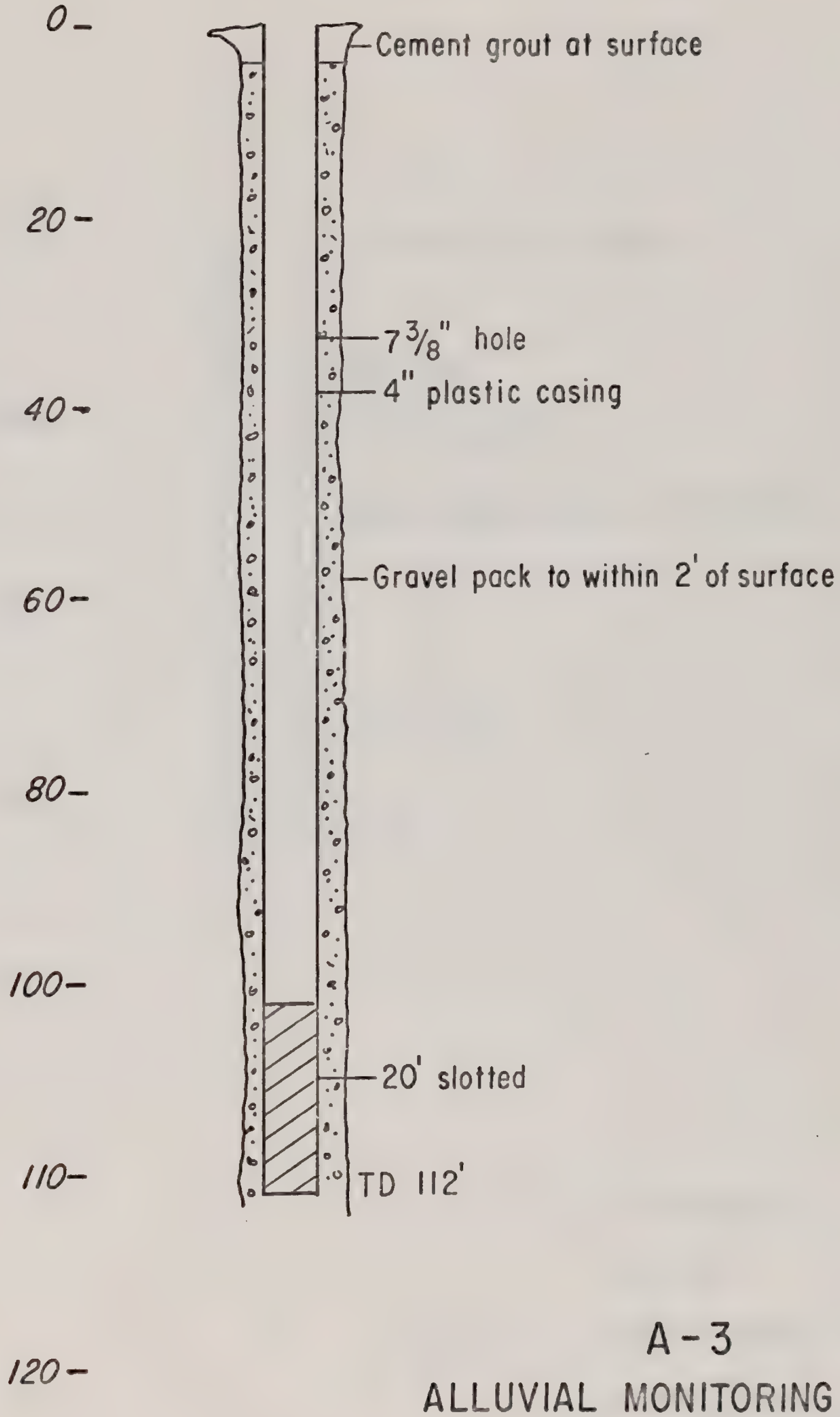

0-
20-
40-
60-
80-
100-
Cement grout at surface
7 3/8" hole
4" Plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 82'

A-2

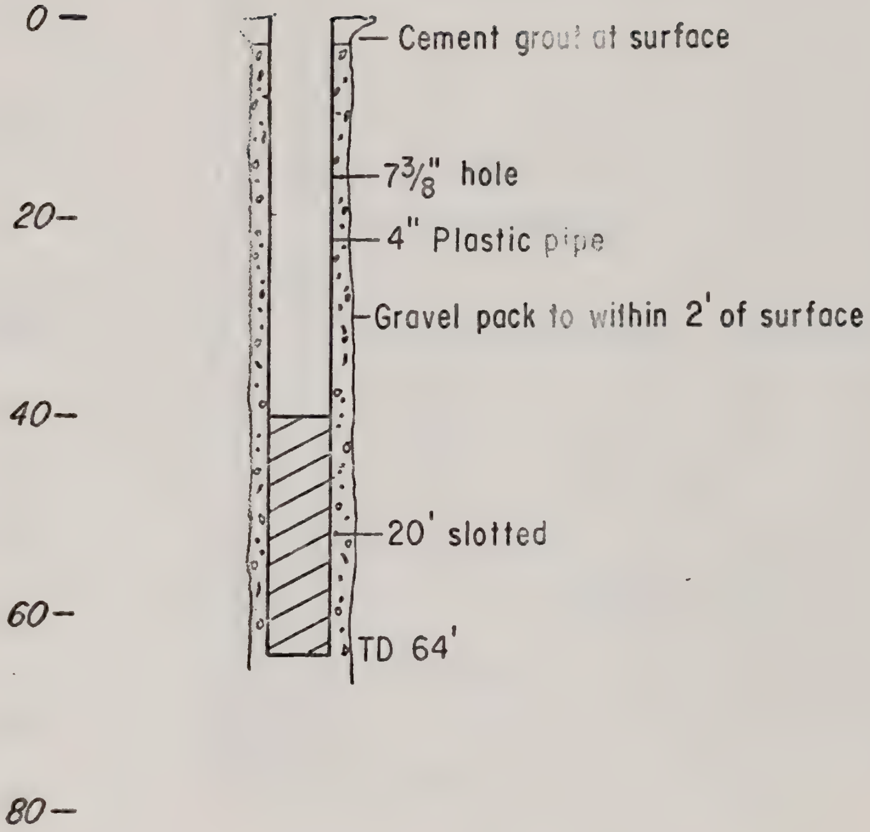
ALLUVIAL MONITORING WELL

C-b TRACT

NE, NE, Section 35, T2S, R 97 W


0
20
40
60
80
100
110
120
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 112'

A-3
ALLUVIAL MONITORING WELL
C-b TRACT
SW, NE, Section 13, T3S, R97W


0
20
40
60
80
Cement grout at surface
7 3/8" hole
4" Plastic pipe
Gravel pack to within 2' of surface
20' slotted
TD 64'

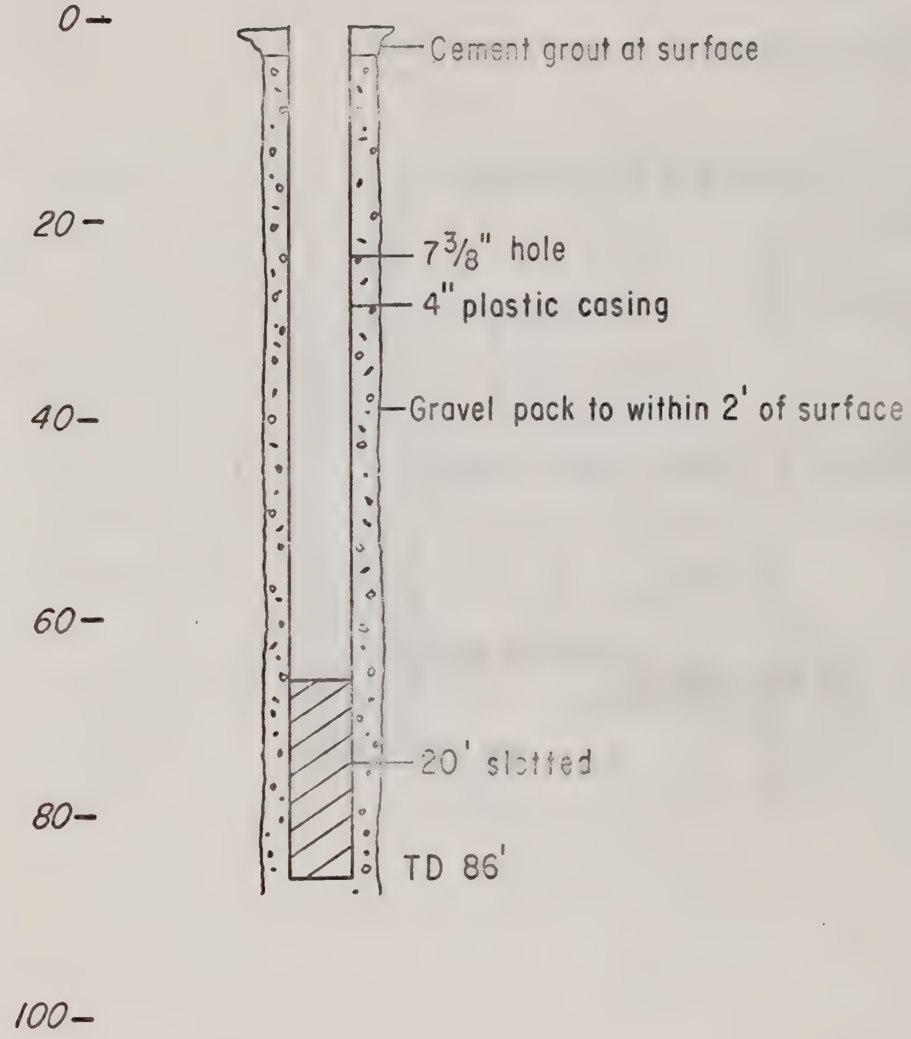
Dry & Abandoned

A-4

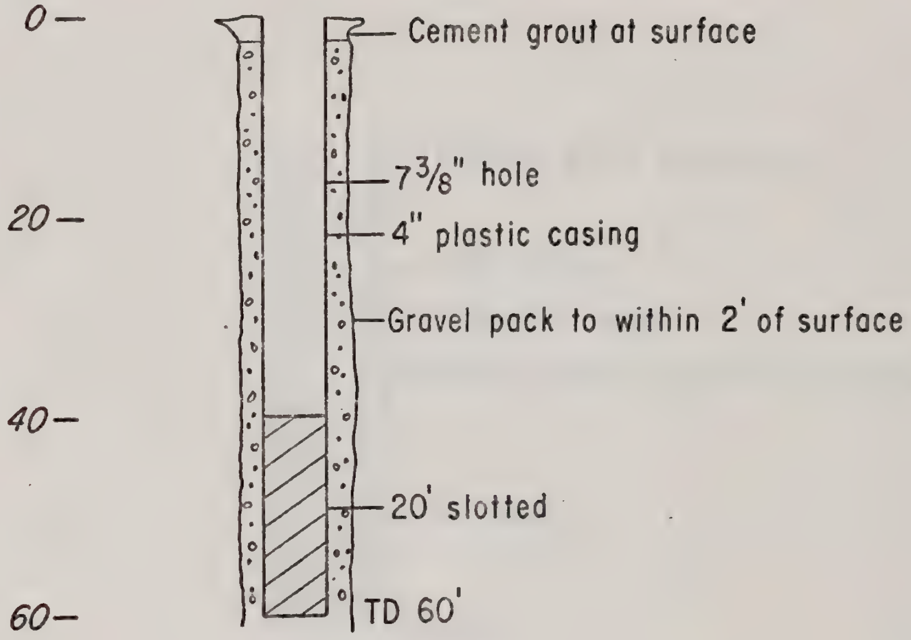
ALLUVIAL MONITORING WELL

C-b TRACT

SW, NE, Section 13, T3S, R 97W


0
20
40
60
80
100
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 86'

A-5
ALLUVIAL MONITORING WELL
C-b TRACT
SE, NE, Section 36, T2S, R97W

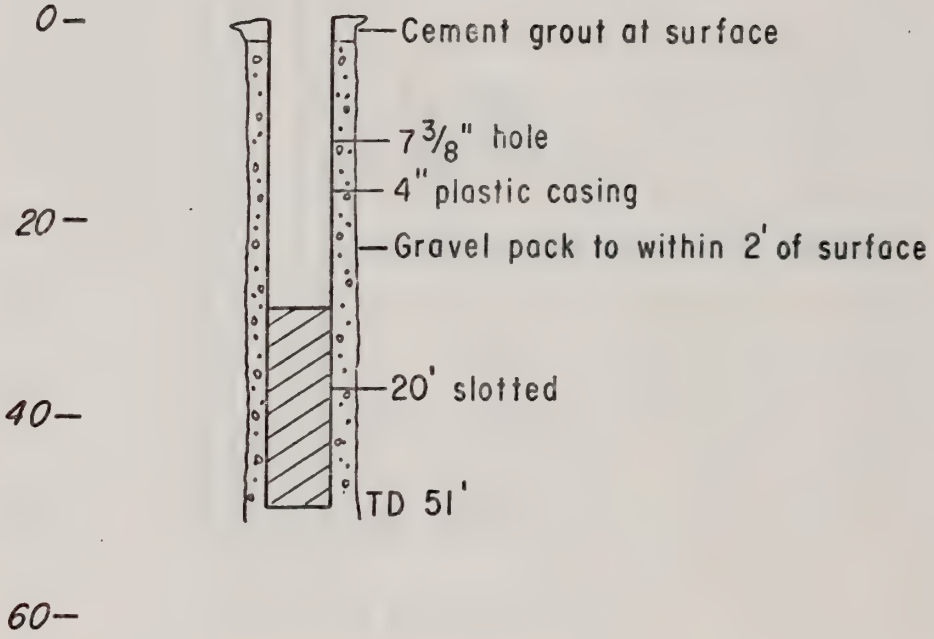

0
20
40
60
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 60'

A-6

ALLUVIAL MONITORING WELL

C-b TRACT

SW, SE, Section 31, T2S, R 97 W

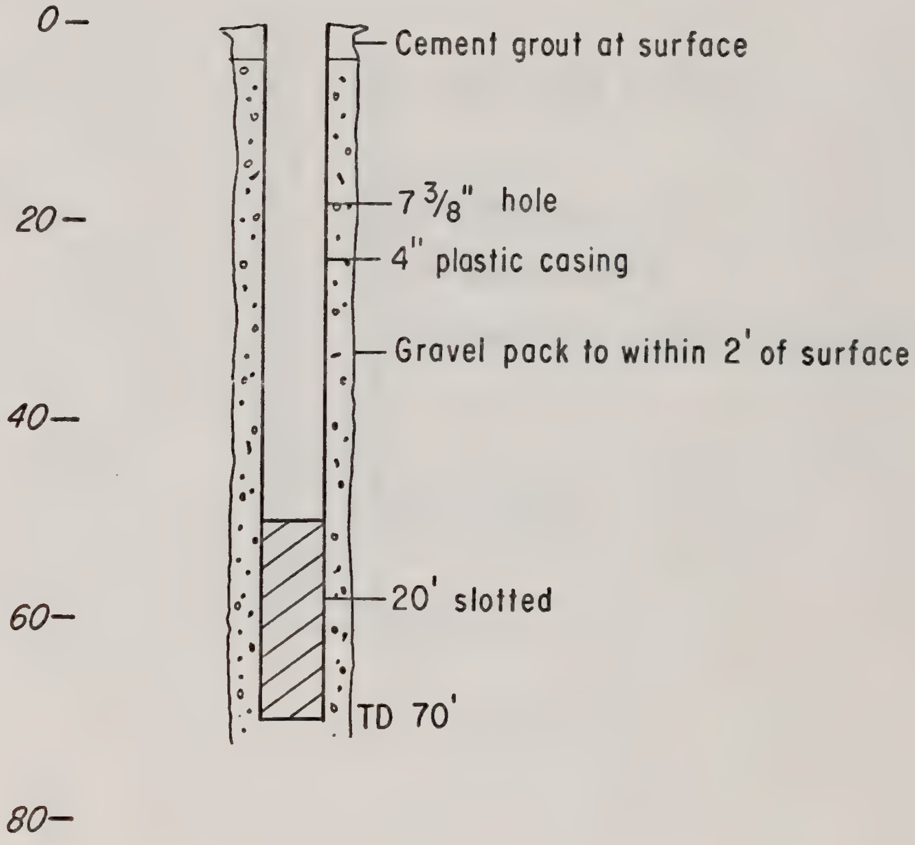

0
20
40
60
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 51'

A-7

ALLUVIAL MONITORING WELL

C-b TRACT

NW, NW, Section 5, T 3S, R 96W

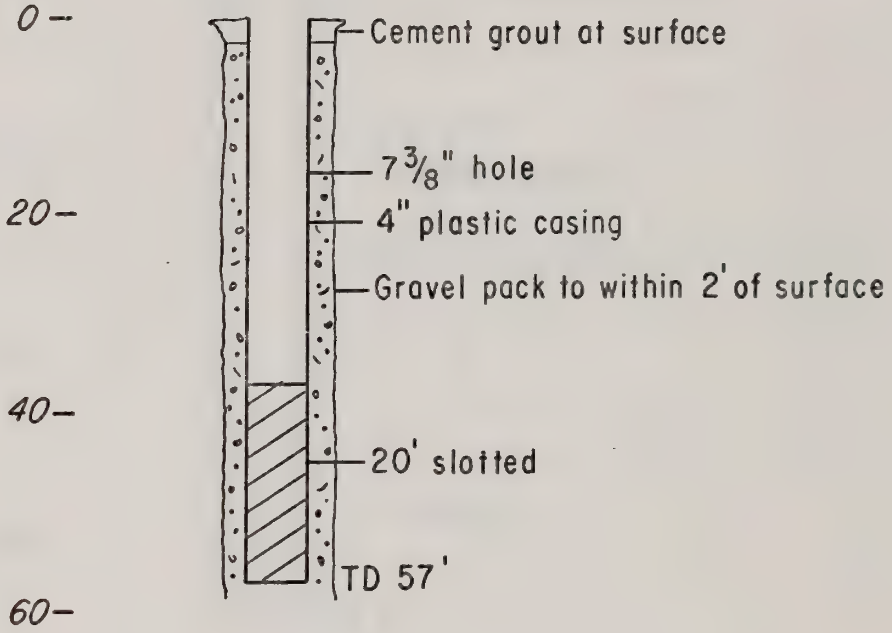

0
20
40
60
80
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 70'

A-8

ALLUVIAL MONITORING WELL

C-b TRACT

SE, NE, Section 5, T3S, R 96 W

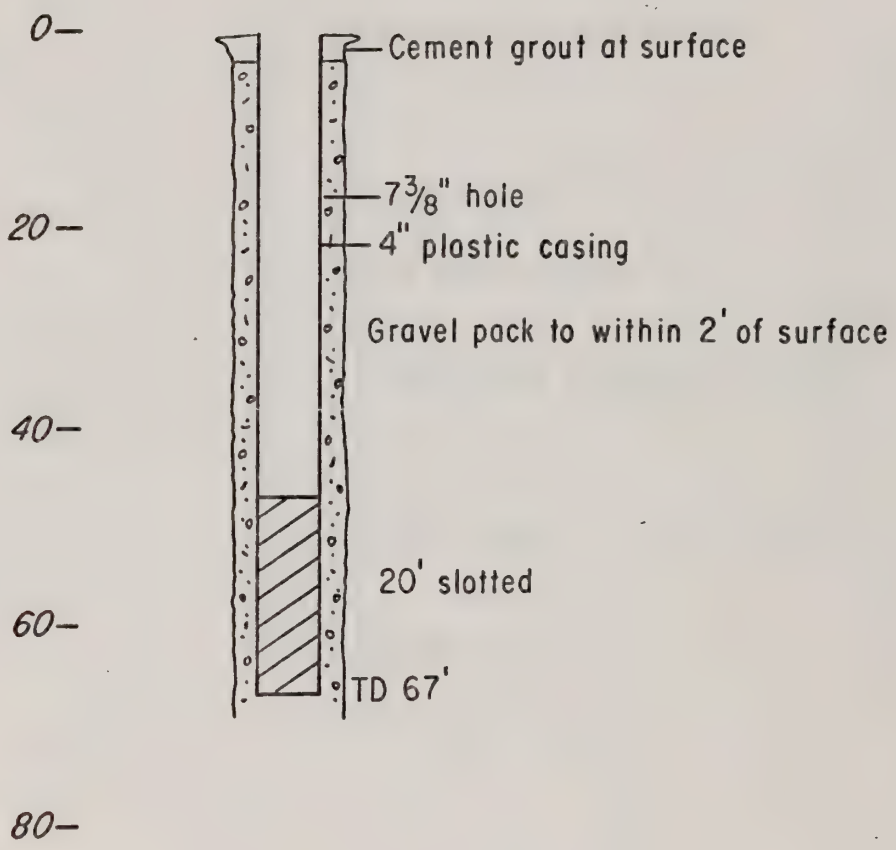

0
20
40
60
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 57'

A-9

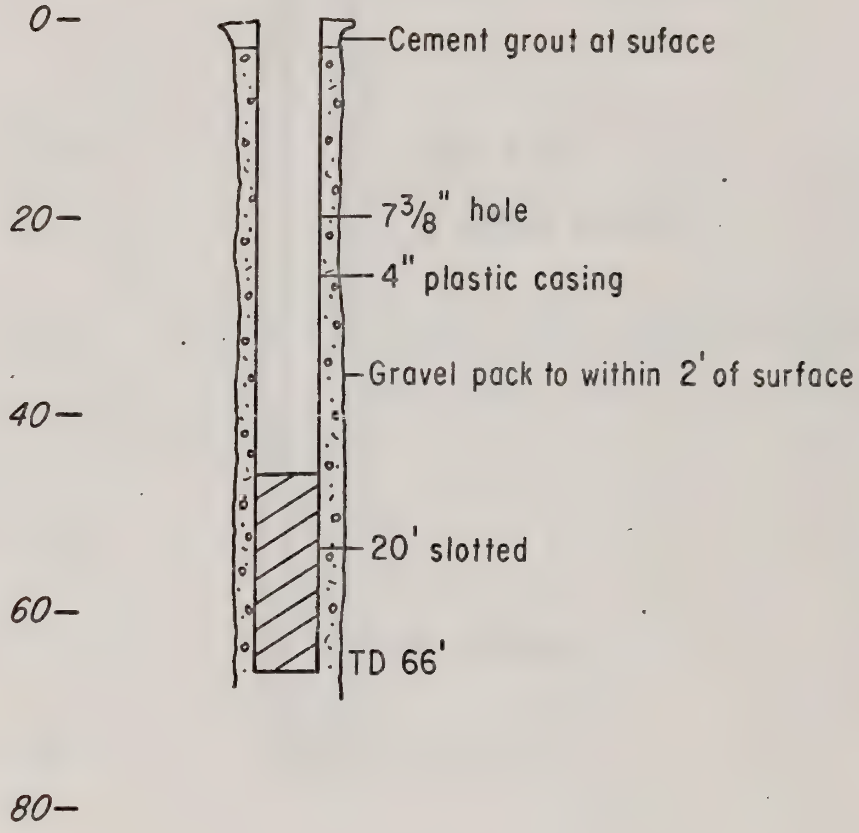
ALLUVIAL MONITORING WELL

C-b TRACT

NE, SW, Section 9, T3S, R96W


0
20
40
60
80
Cement grout at surface
$7\frac{3}{8}$" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 67'

A-10
ALLUVIAL MONITORING WELL
C-b TRACT
SE, NW, Section 16, T3S, R96W

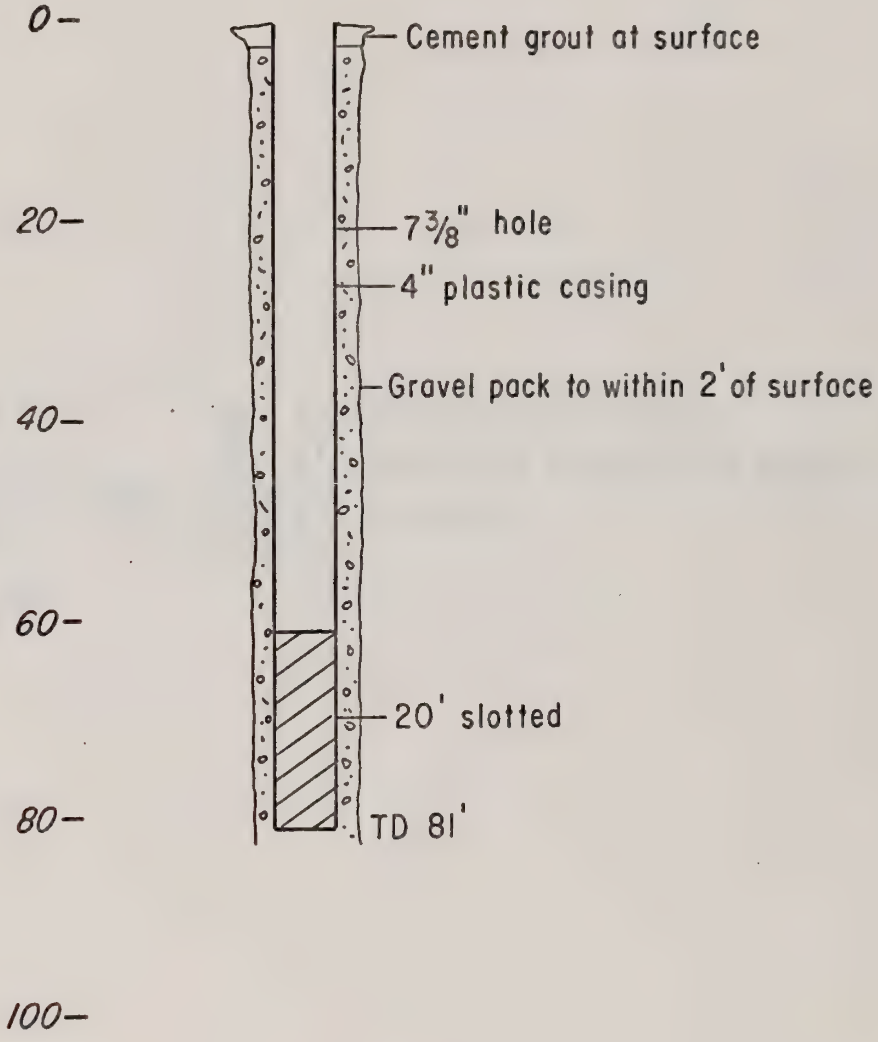

0–
20–
40–
60–
80–
Cement grout at suface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 66'

A-11

ALLUVIAL MONITORING WELL

C-b TRACT

NE, SE, Section 8, T3S, R96W

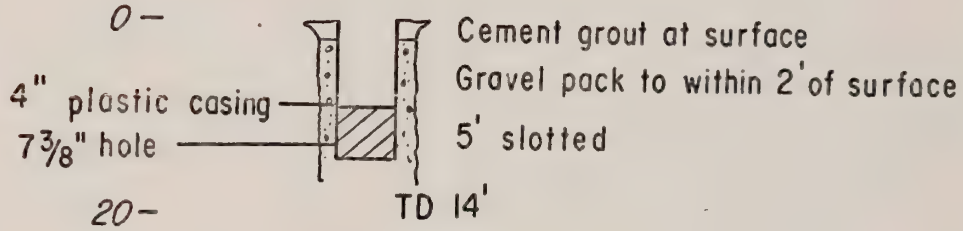

0
20
40
60
80
100
Cement grout at surface
7 3/8" hole
4" plastic casing
Gravel pack to within 2' of surface
20' slotted
TD 81'

A-12

ALLUVIAL MONITORING WELL

C-b TRACT

SW, SE, Section 17, T 3S, R 96 W


0–
4" plastic casing
7⅜" hole
20–
Cement grout at surface
Gravel pack to within 2' of surface
5' slotted
TD 14'

Dry & Abandoned

A-13

ALLUVIAL MONITORING WELL

C-b TRACT

NW, SE, Section 18, T 3S, R 96 W

Jetting Tests

TABLE II B-4
CALCULATED TRANSMISSIVITY VALUES

Well No.	Jet Test Drill Stem Test No.	Transmissivity, Recovery (G/D/Ft)	Transmissivity, Drawdown (G/D/Ft)	Depth To Bottom of Open Interval (Ft)	Drill Stem Test Interval (Ft)	Ground Level Elevation (Ft)	Test Date (1974)
A.T.-1	JT-1	890	----	952		6909	6/29
A.T.-1a	JT-1	384	260	960		6909	6/17
	JT-2	1266	925	1344			6/22
	JT-3	1140	850	1424			6/24
	DST-1	1.42	----	----	1520-1590		7/18
	JT-4	1450	1190	1620			7/1
A.T.-1a1	JT-1	2370	1925	1341		6909	7/10
A.T.-1b	JT-1	64	42.5	960		6909	7/17
	JT-2	1360	883	1340			7/18
	JT-3	2250	1640	1425			7/19
	JT-4	4600	3575	1638			7/29
A.T.-1c	JT-1	1040	640	890		6905	8/13
	JT-2	2415	1900	1355			8/15
	JT-3	2365	1830	1430			8/16
	DST-1	Inc.	----	----	1362-1512		8/17
	JT-4	2940	2370	1640			8/19
A.T.-1d	JT-1	930	593	960		6903	7/23
	JT-2	2090	1750	1355			7/25
	JT-3	2060	1610	1430			7/26
	JT-4	2900	1990	1640			7/29
S.G.-6	JT-1	160	100	910		6888	8/1
	JT-2	1880	1440	1350			8/9
	JT-3	2470	1800	1425			8/10
	JT-4	2750	1930	1547			8/12
	JT-5	3285	2442	2220			8/22
S.G.-10	JT-1	190	200	960		6950	6/11
	JT-2	2975	2170	1336			6/14
	JT-3	3010-4400	2270	1416			6/14
	DST-1	9.6	2.4	----	1480-1600		7/19
	JT-4	7300	4865	2211			6/30
S.G.-10a	JT-1	3100	2050	1333		6950	7/10
S.G.-11	JT-1	1000	730	808		6900	7/26
	JT-2	880	510	868			7/27
	JT-3	5050	3950	1330			8/9
	JT-4	4235	3250	1385			8/9
	JT-5	2360	1690	1490			8/12
	JT-6	5625	3750	2465			8/26
	JT-7	6000	4350	2825			9/1
S.G.-8	JT-1	2485	1709	600		6538	10/26
	JT-2	4040	2463	971			11/5
	JT-3	6025	4950	1013			11/15
	JT-4	7904	5597	2117			11/21
	JT-5	10,100	7110	2608			11/27
S.G.-9	JT-1	230	178	993		6870	9/30
	JT-2	1020	755	1285			10/5
	JT-3	1340	1090	1360			10/5
	JT-4	2890	2125	2460			10/19
	JT-5	2318	1904	2750			10/23
S.G.-18	JT-1	779	50	960		7383	10/1
	JT-2	1800	1400	1426			10/5
S.G.-18a	JT-1	963	----	1330		7383	10/18
S.G.-19	JT-1	7260	4940	466		6382	9/20
	JT-2	22,000	17,000	930			9/23
	JT-3	11,850	9,250	980			9/27
Cb-2b	JT-1	19.5-330	18.3-206	890		6737	8/26

Jetting Tests

Jetting tests have been conducted on a large number of the wells and coreholes drilled on and adjacent to Tract C-b. (Refer to Table III B-1) During the conducting of such a test water in the drill stem is blown or jetted to the surface at a uniform rate with air. After a period of time, two hours in most cases, the jetting is stopped. Geologists then measure the rise in water levels (both depth and rate) with an electric well sounder. The data is then graphed, depths vs. time, and the transmissivity (a measure of permeability) calculated using the Modified Non-Equilibrium Method developed by Jacob (1950). This method is described in many hydrologic texts, and in U.S. Geological Survey Water Supply paper 1536-E, "Theory of Aquifer Tests", by Ferris, Knowles, Brown and Stallman (1962).

Presented in this section in Table II B-4 are the calculated drawdown and recovery transmissivity values determined for given open intervals or zones for those wells tested. Following this table is an example calculation (Fig. II B-2) of a transmissivity value determination based upon the actual field data compiled for corehole SG-11. By using this technique, the transmissivity values tabulated in Table II B-4 were calculated from the field data, presented in its raw form following Fig. II B-2.

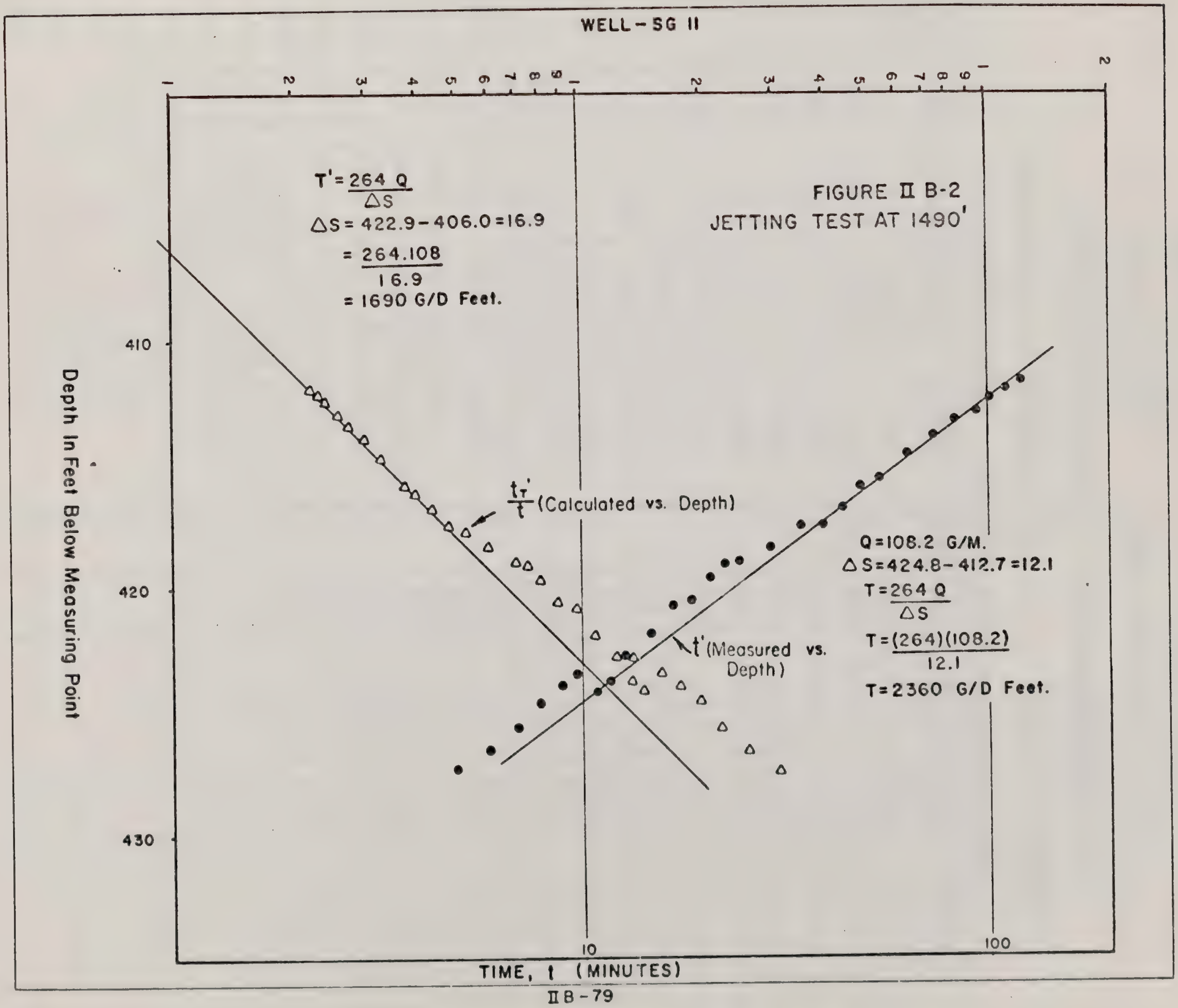


FIGURE II B-2
JETTING TEST AT 1490'

$T' = \frac{264\ Q}{\Delta S}$

$\Delta S = 422.9 - 406.0 = 16.9$

$= \frac{264.108}{16.9}$

$= 1690$ G/D Feet.

$Q = 108.2$ G/M.

$\Delta S = 424.8 - 412.7 = 12.1$

$T = \frac{264\ Q}{\Delta S}$

$T = \frac{(264)(108.2)}{12.1}$

$T = 2360$ G/D Feet.

PUMP TEST DATA SHEET ; WELL NO. 56 Aquifer
Top of Parachute Creek
Test #1

PUMPED WELL ____ : OBSERVATION WELL ____
Depth : 952.1

DATE: 6-29-74 STATIC WATER LEVEL 390.7'

PUMP [✓ (ON)] (OFF) AT 12:05 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 1.2 FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	°C	WATER LEVEL DEPTH BELOW MP mhos		PUMP RATE Flume	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
12:15	10	19	1200		.12		14	423.7	9.5	
12:25	20	19	1100		.10		16	422.2	8.5	
	30	18	1150		.18		18	422.3	7.6	
	40	18	1100		.20		20	419.8	7.0	
	50	17.5	1050		.20		25	418.7	5.8	
	60	18	1000		.17		30	417.2	5.0	
	70	17	1000		.18		35	415.8	4.4	
	80	17.5	1000		.19		40	414.6	4.0	
	90	17	1000		.18		45	413.5	3.66	
	100	17	1000		.195		50	412.8	3.4	
	110	17	1060		.21		60	411.3	3.0	
14:05	120	17	1000		.20		70	409.6	2.7	
		Blow for two					80	406.6	2.5	
		extra hours		T/T'			90	408.1	2.33	
	1						100	406.0	2.2	
	2						110	405.2	2.09	
	3						120	404.4	2.0	
	4	432.		31						
	5	429.9		25						
	6	428.4		21						
	7	428.0		18						
	8	— .		16						
	9	426.3		14.3						
	10	429.2		13						
	12	428.2		11						

Top of Parachute Creek @ 400

PUMP TEST DATA SHEET ; WELL NO. 1-A

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 6-17-74 STATIC WATER LEVEL ________

PUMP [✓ ON] (OFF) AT 8:25 (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ YES] (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
8:25	0	Temp	Conduc	flume						
	10	15°C	1000	.02			12			
	20	15	1000	.08			14			
	30	15	1000	.14			16			
	40	15	1000	.18			18			
	50	16	1050	.19			20			
	60	16	1000	.16			25	440.1		5.8
	70	16.5	1000	.07			30	439.9		5.0
	80	16.5	950	.19			35	436.9		4.4
	90	16.5	1000	.17			40	434.5		4.0
	100	16.5	1000	.17			45	432.8		3.7
	110	17	1000	.18			50	431.2		3.4
	120	17	1000	.16			60	428.2		3.0
							70	425.9		2.7
10:25	0	Depth			T/T'		80	424.1		2.5
	1						90	422.1		2.33
	2						100	420.5		2.2
	3						110	418.9		2.09
	4						120	417.5		2.0
	5									
	6									
	7									
	8									
	9									
	10									

Top of Mining Zone @ 1344

PUMP TEST DATA SHEET ; WELL NO. 1-A

PUMPED WELL ______ OBSERVATION WELL ______

DATE: 6-22-74 STATIC WATER LEVEL 420

PUMP [✓ (ON)] (OFF) AT ______ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ______ CONDUCTIVITY ______ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 5.4 FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
	0	Temp	Conduc	flow	
	10	19°C	1050	—	
	20	21	1000	.21	
	30	21	1000	.31	
	40	22	1000	.34	
	50	21	1000	.36	
	60	23	1000	.35	
	70	22	1000	.35	
	80	22	1000	.36	
	90	22	1000	.36	
	100	22	1000	.34	
	110	22	1000	.35	
	120	—	—	—	
	0	Depth			T/T'
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9	470.7			14.3
	10	473.4			13.0

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	12	471.8		11.0
	14	468.7		9.6
	16	466.0		8.5
	18	463.2		7.7
	20	462.4		7.0
	25	457.9		5.8
	30	454.3		5.0
	35	451.4		4.4
	40	449.6		4.0
	45	447.7		3.7
	50	446.3		3.4
	60	444.0		3.0
	70	441.8		2.7
	80	440.1		2.5
	90	438.6		2.33
	100	437.2		2.2
	110	436.0		2.09
	120	434.9		2.0

Bottom of Mining Zone @ 1424

PUMP TEST DATA SHEET ; WELL NO. 1-A

PUMPED WELL ____________ OBSERVATION WELL ____________

DATE: 6-24-74 STATIC WATER LEVEL 352

PUMP (ON) (OFF) AT ________ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 5.4 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	0	Temp	Conduc	flow						
	10	16.0	1000	.10			10	423.5		13.0
	20	19.5	1000	.28			12	421.5		11.0
	30	20.5	1000	.35			14	Sounder went dead		
	40	20.5	1000	.37			16			
	50	21.0	1000	.37			18	Going w/ new sounder		
	60	21.0	1000	.36			20			
	70	21.0	1000	.36			25	445.1		5.8
	80	21.0	1000	.36			30	449.8		5.0
	90	21.5	1000	.36			35	448.4		4.4
	100	21.5	1000	.36			40	444.6		4.0
	110	21.5	1000	.36			45	442.4		3.7
	120	21.5	1000	.36			50	440.7		3.4
							60	435.9		3.0
							70	434.4		2.7
	0	Depth			T/T'		80	435.4		2.5
	1						90	434.8		2.33
	2						100	435.5		2.2
	3						110	433.5		2.09
	4						120	432.5		2.0
	5									
	6									
	7	470.0			18.8					
	8	448.7			16					
	9	431.5			14.3					

Depth in Feet Below Measuring Point

PUMP TEST DATA SHEET ; WELL NO. 1A

Pkr set @ 1440' PUMPED WELL ________ OBSERVATION WELL ________

Testing communication DATE: 7-19-74 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. no CONDUCTIVITY no SAMPLE TAKEN (YES) [✓ NO]

MP = MEASURING POINT MP 7.5 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
9:45	5	892.8							
	10	836.0							
	15	814.1							
	20	783.9							
	25	757.8							
	30	741.0							
	35	721.5							
	40	699.9							
	45	684.3							
	50	666.0							
	55	648.5							
	60	629.8							
	65	614.7							
	70	600.4							
	75	586.3							
	80	574.5							
	85	561.7							
	90	549.8							
	95	538.7							
	100	527.0							
	105	517.9							
	110	509.1							

Perforated Interval 1520-1590

PUMP TEST DATA SHEET ; WELL NO. 1-A

Total Depth 1621'

PUMPED WELL ______ OBSERVATION WELL ______

Jetted w/ tubing @ 1180'

DATE: 7-18 STATIC WATER LEVEL ______

Blow 30 min end @ 2:40 a.m.

PUMP (ON) (OFF) AT ______ (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ NO]

MP = MEASURING POINT MP 7.5 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	0	Temp Conduc	flow						
	10								
	20					110	475.0		
	30					115	467.9		
	40					120	460.8		
	50					125	453.8		
	60	estimated flow 5 g.p.m.				130	448.9		
	70					135	444.4		
	80					140	440.0		
	90					145	435.6		
	100								
	110								
	120								
3:35	60	710.5							
	65	663.0							
	70	630.6							
	75	608.0							
	80	578.8							
	85	552.3							
	90	536.0							
	95	511.8							
	100	497.3							
	105	483.3							

Total Depth @ 1620'

PUMP TEST DATA SHEET ; WELL NO. 1-A

PUMPED WELL ______ - OBSERVATION WELL ______

DATE: 7-1-74 STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 2002 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 5.4 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
8:02	0	Temp	Conduc	Flow						
	10	21°C	1050	.16			12	473.2		11.0
	20	21.5	1050	.31			14	471.1		9.5
	30	22	1050	35			16	469.0		8.5
	40	22	1050	.35			18	467.4		7.7
	50	22	1050	.36			20	466.0		7.0
	60	22	1050	35			25	462.9		5.8
	70	22	1050	.34			30	460.4		5.0
	80	22	1050	.35			35	458.3		4.4
	90	22	1050	.35			40	466.4		4.0
	100	22	1050	.35			45	454.8		3.67
	110	22	1050	.35			50	453.2		3.4
	120	22	1050	.35			60	450.5		3.0
							70	446.7		2.7
	0	Depth			T/T'		80	446.4		2.5
	1						90	445.1		2.3
	2						100	443.4		2.2
	3									
	4	498.3			31					
	5	492.6			25					
	6	487.5			21					
	7	483.4			18.8					
	8	479.3			16.0					
	9	477.3			14.3					
	10	475.5			13.0					

Depth 1341

PUMP TEST DATA SHEET ; WELL NO. 1-A-1

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 7-10-74 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT 6:10 (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP 2.0 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
6:10	0	Temp:	Conduc	fluor	
	10	20	1100	.35	
	20	22	1100	.37	
	30	22	1100	.38	
	40	21	1180	.37	
	50	22	1180	.37	
	60	22	1180	.37	
	70	22	1150	.38	
	80	22	1150	.38	
	90	22	1150	.37	
	100	22	1150	.37	
	110	21	1180	.37	
	120	21	1180	.37	
		Depth		T/T'	
8:10	1				
	2				
	3				
	4	463.5		124/4	31.0
	5	461.0		125/5	25.0
	6	461.3		126/6	21.0
	7	459.5		127/7	18.1
	8	456.7		128/8	16.0
	9	456.3		129/9	14.3
	10	455.5		130/10	13.0

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		Depth	T/T'	
	12	454.0	132/12	11.0
	14	453.1	134/14	9.6
	16	452.1	136/16	8.5
	18	451.3	138/18	7.7
	20	450.5	140/20	7.0
	25	448.6	145/25	5.8
	30	447.0	150/30	5.0
	35	445.4	155/35	4.4
	40	444.0	160/40	4.0
	45	442.8	165/45	3.7
	50	441.8	170/50	3.4
	60	439.7	180/60	3.0
	70	438.4	190/70	2.7
	80	436.6	200/80	2.5
	90	435.4	210/90	2.33
	100	434.1	220/100	2.2
	110	432.9	230/110	2.09
	120	432.0	240/120	2.0

Top of Parachute Creek @ 960′

PUMP TEST DATA SHEET ; WELL NO. 1-B

PUMPED WELL ____________ OBSERVATION WELL ____________

DATE: 7-17-74 STATIC WATER LEVEL ____________

PUMP [✓ (ON)] (OFF) AT 9:45 p.m. (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP 7 FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
9:45	0	flume	conduc	temp				Depth		T/T′
	10	.16	1100	16°C			10	422		13.0
	20	.16	1050	15.5			12	433.9		11.0
	30	.05	1050	16			14	442.9		9.6
	40	.03	1050	16			16	427.8		8.5
	50	.08	1050	15.5			18	425.3		7.7
	60	.10	1050	15.5			20	412.9		7.0
	70	.11	1050	15.5			25	404.6		5.8
	80	.10	1050	15.5			30	396.3		5.0
	90	.11	1050	15.5			35	391.7		4.4
	100	.11	1025	15.5			40	389.0		4.0
	110	.10	1025	16			45	387.4		3.7
	120	.10	1025	16			50	385.4		3.4
							60	383.3		3.0
							70	383.0		2.7
11:45	0	Depth			T/T′		80	382.1		2.5
	1						90	380.7		2.33
	2						100	380.2		2.2
	3						110	379.7		2.09
	4						120	379.1		2.0
	5									
	6									
	7	430								
	8									
	9									

Top of Mining Zone @ 1340

PUMP TEST DATA SHEET ; WELL NO. 1-B

PUMPED WELL 1-B OBSERVATION WELL ______

DATE: ______ STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 11:00 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP 1.9 FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
11:00	0	flume	conduc	temp						
	10	.45	1700	22			10			
	20	.44	1350	22			12			
	30	.43	1100	22			14			
	40	.43	1125	22			16	435.6		8.5
	50	.33	1100	22.5			18	439.4		7.7
	60	.43	1100	22.5			20	423.1		7.0
	70	.43	1100	22.5			25			5.8
	80	.43	1100	22.5			30	442.2		5.0
	90	.43	1100	22.5			35	458.7		4.4
	100	.43	1100	22			40	456.1		4.0
	110	.43	1100	22			45	453.5		3.7
	120	.43	1100	22			50	452.6		3.4
							60	448.3		3.0
							70	445.2		2.7
1:00	0	Depth			T/T'		80	442.5		2.5
	1						90	439.3		2.33
	2						100	437.7		2.2
	3						110	436.4		2.09
	4						120	433.7		2.0
	5									
	6									
	7	420?								
	8	423.5?								
	9									

Bottom of Mining Zone @ 1425

PUMP TEST DATA SHEET ; WELL NO. 1-B

PUMPED WELL 1-B OBSERVATION WELL ______

DATE: 7-19-74 STATIC WATER LEVEL ______

PUMP [✓ ON] (OFF) AT 2:10 (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ NO]

MP = MEASURING POINT MP 7 FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
2:10	0	flume	conduc	Tmp	
	10	.31	1200	17°C	
	20	.45	1000	20	
	30	.46	1000	21	
	40	.46	1000	21	
	50	.46	1000	21	
	60	.45	1000	21	
	70	.45	1000	21	
	80	.45	1050	21	
	90	.45	1000	21	
	100	.45	1000	21	
	110	.45	1000	21	
	120	.45	1000	21	
4:10	0	Depth			T/T'
	1				
	2				
	3				
	4				
	5				
	6	503			21.0
	7	490			18.1
	8	480			16.0
	9	471			14.3
	10	466.5			13.0

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	12	464.5		11.0
	14	460.0		9.6
	16	458.5		8.5
	18	457.5		7.7
	20	455.5		7.0
	25	452.6		5.8
	30	450.0		5.0
	35	448.2		4.4
	40	446.2		4.0
	45	444.8		3.7
	50	443.2		3.4
	60	441.0		3.0
	70	438.8		2.7
	80	437.0		2.5
	90	435.4		2.33
	100	434.0		2.2
	110	432.8		2.09
	120	431.6		2.0

Total Depth @ 1638'

PUMP TEST DATA SHEET ; WELL NO. 1-B

PUMPED WELL 1-B OBSERVATION WELL ______

DATE: 7-29-74 STATIC WATER LEVEL ______

PUMP [✓ ON] (OFF) AT 5:10 (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ NO]

MP = MEASURING POINT MP 7'2" FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
5:10	0	flume	conduc	temp				Depth		T/T'
	10	.54	1000	20.0			10	461.0		13.0
	20	.63	1050	21.0			12	458.9		11.0
	30	.65	1000	21.5			14	457.8		9.6
	40	.66	1050	22.0			16	455.9		8.5
	50	.66	1050	22.0			18	454.7		7.7
	60	.66	1100	22.0			20	453.9		7.0
	70	.66	1100	22.0			25	452.2		5.8
	80	.57	1100	22.0			30	450.7		5.0
	90	57	1100	22.0			35	449.4		4.4
	100	.53	1100	21.0			40	448.4		4.0
	110	.52	1100	21.5			45	447.3		3.7
	120	.55	1100	22.0			50	446.3		3.4
		Q= .55					60	444.5		3.0
							70	443.3		2.7
7:10	0	Depth			T/T'		80			
	1						90			
	2						100			
	3						110			
	4						120			
	5									
	6									
	7	467.3			18.1					
	8	4646			16.0					
	9	464.1			14.3					

Top of Parachute Creek @ 890′

PUMP TEST DATA SHEET ; WELL NO. 1-C

PUMPED WELL ______ ; OBSERVATION WELL ______

DATE: 8-13-74 STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 12:35 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
12:35	0	Temp	Conduc	flume				Depth		T/T′
	10	16.0°C	1300	—			12	440.0		11.0
	20	16.0	1175	—			14	439.6		9.6
	30	16.5	1100	.12			16	436.6		8.5
	40	16.5	1100	.21			18	434.4		7.7
	50	16.5	1100	.21			20	432.8		7.0
	60	16.5	1100	.21			25	429.7		5.8
	70	17.0	1100	.21			30	427.6		5.0
	80	17.0	1100	.21			35	425.7		4.4
	90	17.0	1100	.21			40	424.6		4.0
	100	17.0	1100	.21			45	423.5		3.7
	110	17.0	1100	.20			50	422.2		3.4
	120	17.0	1100	.20			60	420.8		3.0
							70	419.4		2.7
2:35	0	Depth			T/T′		80	418.1		2.5
	1						90	417.2		2.33
	2						100	416.0		2.2
	3						110	415.4		2.09
	4						120	414.8		2.0
	5									
	6									
	7									
	8									
	9									
	10									

/ Top of Mining Zone @ 1355'

PUMP TEST DATA SHEET ; WELL NO. 1-C

PUMPED WELL 1-C OBSERVATION WELL ______

DATE: 8-15-74 STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 2045 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
2045	0	Temp	Conduc	Flume	
	10	18.0°C	1200	0	
	20	20.0	1100	.49	
	30	20.0	1150	.50	
	40	20.0	1175	.50	
	50	20.0	1200	.50	
	60	20.0	1175	.50	
	70	20.5	1150	.49	
	80	20.5	1150	.49	
	90	20.5	1150	.49	
	100	20.5	1150	.49	
	110	20.0	1150	.49	
	120	20.0	1150	.49	
	0	Depth		T/T'	
	1				
	2				
	3	523.8		123/3	41
	4	505.7		124/4	31
	5	497.8		125/5	25
	6	493.5		126/6	21
	7	491.2		127/7	18.1
	8	489.4		128/8	16
	9	486.6		129/9	14.3
	10	484.9		130/10	13

Flume probably [illegible] in inch of flume readings in X. Drop to .410

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		Depth	T/T'	
	12	483.0	132/12	11
	14	481.5	134/14	9.6
	16	480.0	136/16	8.5
	18	478.8	138/18	7.7
	20	477.9	140/20	7.0
	25	475.8	145/25	5.8
	30	473.9	150/30	5.0
	35	472.3	155/35	4.4
	40	471.1	160/40	4.0
	45	469.7	165/45	3.7
	50	468.6	170/50	3.4
	60	466.6	180/60	3.0
	70	465.0	190/70	2.7
	80	463.4	200/80	2.5
	90	462.1	210/90	2.33
	100	460.8	220/100	2.2
	110	459.6	230/110	2.09
	120	458.6	240/120	2.0

/ Base of the Mining Zone @ 1430'

PUMP TEST DATA SHEET ; WELL NO. 1-C

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 8-16-74 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT 1:15 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP ____ FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
1:15	0	Temp	Condvc	flum.	
	10	21.5°	1250	.60	
	20	21.5	1200	.60	
	30	22.0	1200	.60	
	40	22.0	1250	.30	
	50	21.5	1200	.30	
	60	21.5	1200	.40	
	70	21.5	1200	.40	
	80	21.5	1200	.40	
	90	21.5	1200	.40	
	100	21.5	1250	.40	
	110	21.5	1300	.40	
	120	21.5	1250	.40	
3:15	0	Depth			T/T'
	1				
	2				
	3	508.0			41
	4	496.2			31
	5	489.3			25
	6	486.1			21
	7	483.2			18.1
	8	481.1			16.0
	9	479.8			14.3
	10	479.1			13.0

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	12	477.7		11.0
	14	476.3		9.6
	16	475.5		8.5
	18	474.7		7.7
	20	473.6		7.0
	25	471.3		5.8
	30	469.5		5.0
	35	467.9		4.4
	40	466.7		4.0
	45	465.3		3.7
	50	464.3		3.4
	60	462.6		3.0
	70	460.8		2.7
	80	459.4		2.5
	90	458.0		2.33
	100	457.0		2.2
	110	456.0		2.09
	120	455.0		2.0

Drill Stem Test - T.D. @ 1512' ; Packer set @ 1302

PUMP TEST DATA SHEET ; WELL NO. 1-C

PUMPED WELL ____________ OBSERVATION WELL ____________

DATE: 8-17-74 STATIC WATER LEVEL ____________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. ______ CONDUCTIVITY ________ SAMPLE TAKEN [✓ YES] (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
7:38	0								
	1	560							
	2	540					Conduc.	Temp	
7:41	3						1600	16.5	
7:42	4						1575	16.5	
7:43	5	490			11:54		1575	16.0	
7:44	6				11:57		1500	15.5	
7:45	7	475.60			1200		1550	16.0	
7:46	8	473.80			1220		1475	15.5	← samples taken
7:47	9	472.60							
7:48	10	472.00			24th	stand	2000	16°	
7:50	12	470.65			32nd	"	1800	15.5	
7:52	14	469.65			36th	"	1775	15.5	
7:57	19	468.85			2nd	collar	2150	15.5	
7:58	20	467.65							
8:03	25	467.15							
8:08	30	466.35							
8:13	35	465.85							
8:18	40	465.40							
8:23	45	465.10							
8:33	55	464.65							
8:38	60	464.70							
8:48	70	464.00							
	80								
	90								

Total Depth
1640′

PUMP TEST DATA SHEET ; WELL NO. 1-C

PUMPED WELL ______ OBSERVATION WELL ______

DATE: 8-19-74 STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 2400 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
2400	0	Temp	Conduc	flu[illegible]	
	10	17.0°C	1375	—	
	20	18.0	1300	—	
	30	19.0	1250	.45	
	40	19.5	1200	.45	
	50	20.0	1200	.45	
	60	20.0	1200	.45	
	70	20.0	1200	.45	
	80	20.0	1200	.45	
	90	20.5	1200	.45	
	100	20.5	1200	.45	
	110	20.5	1200	.45	
	120	20.5	1175	.45	
		Depth		T/T′	
	1				
	2				
	3				
	4	504.6		31	
	5	492.3		25	
	6	485.4		21	
	7	480.0		18.1	
	8	475.3		16.0	
	9	474.0		14.3	
	10	469.7		13.0	

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		Depth	T/T′	
	12	468.2	11.0	
	14	467 3	9.6	
	16	464.8	8.5	
	18	463.4	7.7	
	20	462.2	7.0	
	25	459.9	5.8	
	30	458.1	5.0	
	35	456.7	4.4	
	40	455.3	4.0	
	45	454.3	3.7	
	50	453.3	3.4	
	60	451.6	3.0	
	70	450.0	2.7	
	80	448.8	2.5	
	90	447.7	2.33	
	100	446.7	2.2	
	110	445.9	2.09	
	120	445.1	2.0	

/

Top of Parachute Creek @ 960′

PUMP TEST DATA SHEET ; WELL NO. 1-D

PUMPED WELL ______ OBSERVATION WELL ______

DATE: 7-23-74 STATIC WATER LEVEL ______

PUMP [✓ ON] (OFF) AT 1548 (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ NO]

MP = MEASURING POINT MP 5′ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
1548	0	Flame	Conduc	T°C						
	10	.18	1550	15°			12	415.8		11.0
	20	.18	1400	15			14	408.9		9.6
	30	.19	1350	15			16	405.5		8.5
	40	.18	1300	15			18	402.5		7.7
	50	.17	1250	15			20	400.5		7.0
	60	.17	1200	15			25	396.7		5.8
	70	.22	1200	15			30	393.7		5.0
	80	.23	1200	15			35	391.7		4.4
	90	.23	1200	15			40	390.0		4.0
	100	.23	1200	15			45	388.8		3.7
	110	.23	1200	15			50	387.6		3.4
	120	.23	1200	15			60	385.75		3.0
							70	384.3		2.7
	0	Depth			T/T′		80	383.75		2.5
	1						90	382.75		2.33
	2						100	381.9		2.2
	3						110	381.1		2.09
	4						120	380.5		2.0
	5									
	6	446.7			21.0					
	7									
	8	434.5			16.0					
	9	431.1			14.3					
	10	430.9			13.0					

/

PUMP TEST DATA SHEET ; WELL NO. 1-D

PUMPED WELL ________ OBSERVATION WELL ________

Depth 1355 : MINE Roof

DATE: 7-25-79 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT 23:10 (DRAWDOWN) [✓ (RECOVERY)] TEST

off at 01:10

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP 5 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		Temp.°C	Conductivity		Flume			WATER LEVEL	T/T'	
	10	15.0	1600		.35		12	441.0	11.0	
	20	18.	1300		.40		14	438.4	9.6	
	30	19.	1200		.40		16	437.0	8.5	
	40	19.	1100		.39		18	434.6	7.7	
	50	19.	1100		.39		20	432.8	7.0	
	60	19.	1100		.39		25	430.8	5.8	
	70	20.	1000		.39		30	429.0	5.0	
	80	20	1000		.38		35	427.4	4.4	
	90	20	1000		.38		40	425.9	4.0	
	100	20.	1000		.38		45	424.8	3.7	
	110	20.	1000		.38		50	423.5	3.4	
	120	20.	1000		.38		60	421.4	3.0	
							70	419.7	2.7	
		WATER LEVEL		T/T'			80	418.3	2.5	
	1						90	416.9	2.33	
	2						100	415.8	2.2	
	3						110	414.7	2.09	
	4						120	413.7	2.0	
	5	478.1		25						
	6	465.9		21						
	7	458.2		18.1						
	8	453.6		16.						
	9	450.7		14.3						
	10	447.8		13.						

@ Base of Mining Zone

PUMP TEST DATA SHEET ; WELL NO. 1-D

Depth, 1430'

PUMPED WELL ______ OBSERVATION WELL ______

DATE: 7-26-74 STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 6:50 pm (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP 5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
6:50	0	Temp	- Conduc	flume	
	10	16.5°C	1600	.40	
	20	20.0	1200	.39	filling water truck
	30	20.5	1150	.39	
	40	20.5	1150	.40	
	50	21.0	1100	.41	
	60	20.0	1100	.40	
	70	20.0	1100	.39	
	80	20.0	1100	.40	
	90	20.0	1100	.39	
	100	20.0	1100	.39	
	110	20.0	1100	.39	
	120	20.0	1100	.39	
		Depth		T/T'	
	1				
	2				
	3				
	4				
	5				
	6	cord tangled on the side of the spool			
	7				
	8				
	9				
	10				

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		Depth	T/T'	
	12			
	14			
	16			
	18			
	20			
	25			
	30			
	35	426.5	155/35	4.4
	40	425.9	160/40	4.0
	45	424.6	165/45	3.7
	50	423.3	170/50	3.4
	60	421.2	180/60	3.0
	70	419.2	190/70	2.7
	80	417.8	200/80	2.5
	90	416.3	210/90	2.3
	100	415.0	220/100	2.2
	110	413.8	230/110	2.0
	120	412.8	240/120	2.0

PUMP TEST DATA SHEET ; WELL NO. 1-D

Depth
T.D. 1640

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 7-29 STATIC WATER LEVEL 387.2

PUMP [✓ (ON)] (OFF) AT 1110 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP 5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
1110	0	Temp	Conduc	Flume	
	10	16.0°C	1675	.22	
	20	17.0°C	1600	.40	
	30	18.0°C	1550	.42	
	40	18.5°C	1575	.42	
	50	19.0°C	1450	.43	
	60	19.5°C	1400	.43	
	70	20.0°C	1400	.43	
	80	20.0°C	1400	.44	
	90	20.0°C	1350	.44	
	100	20.0°C	1375	.44	
	110	20.5°C	1350	.44	
	120	21.0°C	1350	.44	
		Depth		T/T'	
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9	437.6		129/9	14.3

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		Depth	T/T'	
	10	434.5	130/10	13.0
	12	431.0	132/12	11.0
	14	428.1	134/14	9.6
	16	425.8	136/16	8.5
	18	423.4	138/18	7.7
	20	421.9	140/20	7.0
	25	419.4	145/25	5.8
	30	417.1	150/30	5.0
	35	415.8	155/35	4 4
	40	414.1	160/40	4 0
	45	412.8	165/45	3.7
	50	411.9	170/50	3.4
	60	410.1	180/60	3.0
	70	408.6	190/70	2.7
	80	407.3	200/80	2.5
	90	406.2	210/90	2.33
	100	405.2	220/100	2 2
	110	404.4	230/110	2 0 9
	120	403.6	240/120	2 0

Ran w/ Bil – Without Float

Top of [illegible] 910'

PUMP TEST DATA SHEET ; WELL NO. SG-6

PUMPED WELL SG #6 OBSERVATION WELL ______

DATE: 8/1/74 STATIC WATER LEVEL ______

PUMP (ON) (~~OFF~~) off AT 7:30 9:30 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 7' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	Temp	WATER LEVEL (Cond.) DEPTH BELOW MP	Fl[illegible]	PUMP RATE
7:30	0	14.5	1600	[illegible]	
	10	15°C	1300	.04	
	20	15°C	1100	.06	
	30	15°C	1000	.08	
	40	15°C	900	.09	
	50	15°C	900	.09	
	60	15°C	900	.09	
	70	15°C	900	.09	
	80	15°C	900	.09	
	90	15°C	900	.09	
	100	15°C	900	.09	
	110	15°C	900	.09	
	120	16°C	850	.09	
				T/t'	
	1				
	2				
	3				
	4				
	5		493.2	25/5	25
	6		475.4		21
	7		467.3		18
	8		460.0		16
	9		454.5		14.8
	10		450.0		13

CLOCK TIME	TIME IN MIN	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
	12	441.2	132/12	11
	14	433.6		9.6
	16	432.4		8.5
	18	428.4		7.7
	20	426.6		7.0
	25	421.8		5.8
	30	417.9		5.0
	35	415.5		4.4
	40	413.2		4.0
	45	411.2		3.7
	50	410.7		3.4
	60	408.2		3.0
	70	406.9		2.7
	80	403.8		2.5
	90	403.4		2.33
	100	401.5		2.2
	110	399.7		2.09
	120	397.7		2.0

Depth
1350'

PUMP TEST DATA SHEET ; WELL NO. SG-6

PUMPED WELL SG-6 OBSERVATION WELL ________

DATE: 8/9/74 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT 7:50
off 9:50
(DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 2' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	Temp	WATER LEVEL DEPTH BELOW MP	Flow	PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
7:50	0						12	461.3	11	
	10	16.5°C	1300	.11			14	460.3	9.6	
	20	19.5°C	1250	.33			16	459.5	8.5	
	30	20°C	1200	.37			18	457.7	7.7	
	40	20°	1200	.37			20	455.6	7.0	
	50	20°	1250	.37			25	453.0	58	
	60	20.5	1250	.37			30	451.2	5.0	
	70	20.5	1250	.37			35	449.7	44	
	80	20.0	1250	.37			40	448.2	4.0	
	90	20.5	1250	.36			45	446.7	3.7	
	100	20.5	1250	.35			50	446.0	3.4	
	110	20.5	1250	36			60	443.5	3.0	
	120	20.5	1250	.36			70	441.6	2.7	
							80	440.0	2.5	
				T/t'			90	438.8	2.33	
	1						100	437.5	2.2	
	2						110	436.5	2.09	
	3						120	435.0	2.0	
	4									
	5									
	6		473.1	21						
	7		470.3	18						
	8		468.4	16						
	9		466.0	14.3						
	10		463.3	13						

Base of Mining Zone @ 1425'

PUMP TEST DATA SHEET ; WELL NO. SG #6

PUMPED WELL ____________ OBSERVATION WELL ____________

DATE: 8-10-74 STATIC WATER LEVEL ____________

PUMP [✓ (ON)] (OFF) AT 11:31 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 7 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
11:31	0	Temp	Cond	Clar						
	10	21.50	2500	.33			12	461.6		11.0
	20	22.0	1200	.39			14	459.4		9.6
	30	22.5	1250	.40			16	459.7?		8.5
	40	22.5	1250	.39			18	458.9		7.7
	50	22.5	1250	.39			20	457.3		7.0
	60	22.5	1250	.39			25	454.8		5.8
	70	22.5	1250	.39			30	452.9		5.0
	80	22.5	1250	.39			35	451.8		4.4
	90	22.5	1250	.39			40	450.7		4.0
	100	22.5	1250	.39			45	449.5		3.7
	110	22.5	1250	.39			50	448.1		3.4
	120	22.5	1250	.39			60	446.5		3.0
							70	445.8		2.7
	0	Depth			T/T'		80	443.8		2.5
	1						90	442.3		2.33
	2						100	441.0		2.2
	3						110	440.7		2.09
	4						120	439.3		2.0
	5	472.8			25					
	6	470.5			21					
	7	467.7			18.1					
	8	466.3			16					
	9	464.6			14.3					
	10	463.4			13.0					

PUMP TEST DATA SHEET : WELL NO. S.G.#6

DEPTH : 1547

PUMPED WELL ____________ OBSERVATION WELL ____________

DATE: 8-12-74 STATIC WATER LEVEL ____________

PUMP [✓ (ON)] (OFF) AT ________ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 7 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
1:45	0	TEMP.	CONDUC		FLUME
1:55	10	21.	1200		.32
	20	22.5	1200		.39
	30	22.0	1250		.40
	40	22.5	1250		.40
	50	22.5	1250		.39
	60	22.5	1250		39
	70	22.5	1300		.39
	80	23.0	1300		.39
	90	23.0	1300		.39
	100	23.0	1300		.39
	110	23.0	1300		.39
	120	23.0	1300		.39
3:45	0	DEPTH		T/T'	
	1				
	2				
	3				
	4				
	5				
	6				
	7	470.0		18.1	
	8	461.6		16.	
	9	460.1		14.3	
	10	464.6		13.	

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		DEPTH	T/T'	
	12	463.9	11.0	
	14	463.5	9.6	
	16	462.1	8.5	
	18	460.8	7.7	
	20	461.2	7.0	
	25	458.6	5.8	
	30	457.8	5.0	
	35	456.1	4.4	
	40	454.9	4.0	
	45	454.0	3.7	
	50	453.1	3.4	
	60	451.6	3.0	
	70	450.2	2.7	
	80	449.1	2.5	
	90	447.9	2.3	
	100	446.9	2.2	
	110	446.2	2.1	
	120	445.5	2.0	

T. D.
2220'

PUMP TEST DATA SHEET ; WELL NO. SG-6

PUMPED WELL SG-6 OBSERVATION WELL ______

DATE: 8/22/74 STATIC WATER LEVEL ______

PUMP (ON) (OFF) AT 2:00 off 4:00 ~~(DRAWDOWN)~~ [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 2 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	Temp	WATER LEVEL conduct DEPTH BELOW MP	[illegible]	PUMP RATE
2:00	0				
	10	20.5°C	1150	.24	
	20	22.5°C	1350	.40	
	30	23°C	1400	.41	
	40	22°C	1400	.41	
	50	22°C	1400	.41	
	60	22°C	1400	.41	
	70	22°C	1400	.41	
	80	22°C	1400	.41	
	90	22°C	1400	.41	
	100	22°C	1400	.40	
	110	22°C	1400	.40	
	120	22°C	1400	.40	
		Depth		T/T'	
	1				
	2				
	3				
	4	485.0			
	5	481.9		5/125	25
	6	479.6			21
	7	477.8			18
	8	476.8			16
	9	476.4			14.3
	10	477.0		10/130	13

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
	12	480	12/132	11
	14	480	14/134	9.6
	16	481.7		8.5
	18	481.4		7.7
	20	480.8		7.0
	25	479		5.8
	30	477.6		5.0
	35	476.7		4.4
	40	475.8		4.0
	45	474.9		3.7
	50	474.1		3.4
	60	472.7		3.0
	70	471.4		2.7
	80	470.2		2.5
	90	469.3		2.33
	100	468.2		2.2
	110	467.3		2.09
	120	466.3		2.0

TOP OF PARACHUTE CREEK @ 992.7

PUMP TEST DATA SHEET ; WELL NO. SG#9

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 9-30 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT 5:30 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 10.5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
5:30	0	TEMP. CONDUC.		FLUME		12	491.1	11.	
	10	15.0 800		.15		14	486.5	9.6	
	20	15.0 850		.16		16	481.9	8.5	
	30	15.0 850		.16		18	478.5	7.6	
	40	15.0 850		.16		20	475.6	7.0	
	50	15.0 850		.17		25	468.7	5.8	
	60	15.0 850		.17		30	463.4	5.0	
	70	15.0 850		.17		35	459.3	4.4	
	80	15.0 850		.17		40	455.5	4.0	
	90	15.0 850		.17		45	452.3	3.6	
	100	15.0 850		.17		50	449.9	3.4	
	110	15.0 850		.17		60	445.3	3.0	
	120	15.0 850		.17		70	444.3	2.7	
						80	440.5	2.5	
	0		T/T'			90	438.8	2.3	
	1					100	435.1	2.2	
	2					110	433.0	2.1	
	3					120	429.2	2.0	
	4	525.2	31						
	5	521.0	25						
	6	515.7	21						
	7	509.5	18.1						
	8	503.7	16.						
	9	500.0	14.3						
	10	496.1	13.						

Top of Mining Zone

PUMP TEST DATA SHEET ; WELL NO. S 6 #9

Depth 1285'

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 10-5-74 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ YES] (NO)

MP = MEASURING POINT MP 0.5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
	0	Temp	Conduc	Flow	
	10	18.5	1150	.29	
	20	19.5	1100	.45	
	30	20.0	1100	.49	
	40	20.0	1100	.40	
	50	20.0	1200	.49	
	60	20.0	1200	.49	
	70	20.0	1200	.47	
	80	20.0	1200	.47	
	90	20.0	1200	.47	
	100	20.0	1200	.47	
	110	20.0	1200	.47	
	120	20.0	1200	47	
		Depth			T/T'
	0				
	1				
	2				
	3				
	4				31.0
	5	555.7			25.0
	6	543.0			21.0
	7	534.8			18.1
	8	526.2			16.4
	9	516.5			14.3

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
		Depth		T/T'
	10	508.4		13.0
	12	501.0		11.0
	14	492.2		9.6
	16	485.5		8.5
	18	481.0		7.6
	20	476.7		7.0
	25	468.4		5.8
	30	462.7		5.0
	35	456.6		4.4
	40	453.0		4.0
	45	449.6		3.6
	50	446.5		3.4
	60	444.5		3.0
	70	440.6		2.7
	80	437.3		2.5
	90	432.4		2.33
	100	430.3		2.2
	110	428.7		2.09
	120	426.5		2.0

—Bottom of Mining Zone @ 1360'

PUMP TEST DATA SHEET ; WELL NO. SG-9

PUMPED WELL SG-9 OBSERVATION WELL ________

DATE: 10/5/74 STATIC WATER LEVEL ?

PUMP [✓ (ON)] (OFF) AT 9:17 ~~(DRAWDOWN)~~ [✓ (RECOVERY)] TEST
off at 11:26

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] ~~(NO)~~

MP = MEASURING POINT MP 0.5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
9:17	0	Temp Conduct	Flow				Depth		T/T'
	10	17°c 1050	.31			12	468.4		11
	20	18.5 1350	.42			14	465.0		9.6
	30	18.5 1300	.44			16	462.1		8.5
	40	19.0 1250	.45			18	460.7		7.6
	50	19.0 1200	.45			20	456.4		7.0
	60	19.0 1200	.45			25	451.7		5.8
	70	19.5 1200	.45			30	448.1		5.0
	80	19.5 1200	.45			35	444.3		4.4
	90	20.0 1200	.46			40	441.4		4.0
	100	20.0 1200	.46			45	438.7		3.6
	110	20.0 1200	.55			50	436.3		3.4
	120	20.0 1200	.45			60	433.4		3.0
						70	430.4		2.7
11:26	0			T/T'		80	427.4		2.5
	1					90	425.9		2.33
	2					100	424.3		2.2
	3					110	422.6		2.09
	4					120	418.9		2.0
	5	494.5		25					
	6	487.2		21					
	7	480.4		18.1					
	8	477.6		16.4					
	9	474.8		14.3					
	10	472.7		13					

PUMP TEST DATA SHEET ; WELL NO. SG #9

TOP GARDEN GULCH @ 2460

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 10-19 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT 23.00 (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	0	TEMP	COND.		FLUME			DEPTH	T/T'	
	10	20.0	1100		.31		12	457.3	11	
	20	21.0	1000		.41		14	455.1	9.6	
	30	21.0	1000		45		16	453.8	8.5	
	40	21.0	1000		.46		18	453.	7.6	
	50	21.5	1000		.46		20	453.	7.0	
	60	21.5	1000		.46		25	453.	5.8	
	70	21.5	1100		.46		30	450.7	5.0	
	80	21.5	1100		.46		35	448.3	4.4	
	90	21.5	1100		.46		40	446.4	4.0	
	100	21.5	1100		.46		45	444.6	3.6	
	110	21.5	1100		.46		50	443.0	3.4	
	120	21.5	1100		.46 = 274 g/m		60	440.6	3.0	
							70	438.7	2.7	
	0	DEPTH		T/T'			80	437.0	2.5	
	1						90	435.6	2.3	
	2						100	434.8	2.2	
	3						110	433.8	2.1	
	4						120	432.7	2.0	
	5	472.1		25						
	6	467.8		21						
	7	464.4		18.1						
	8	461.1		16.4						
	9	460.0		14.3						
	10	459.7		13.0						

ARCO

PUMP TEST DATA SHEET ; WELL NO. SG. #9

T.D.@ 2750

PUMPED WELL SG-9 OBSERVATION WELL ______

DATE: 10-23 STATIC WATER LEVEL ?

PUMP [✓ (ON)] (~~OFF~~) AT 10:00 (DRAWDOWN) [✓ (RECOVERY)] TEST
off — 12:00

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 10.5 FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
	0	Temp Cond,	flume			12	446.8	11	
	10	18.5 1000	.28			14	445.2	9.6	
	20	19.5 1050	.35			16	443.7	8.5	
	30	20.0 1050	.38			18	442.4	7.6	
	40	20.0 1050	.38			20	441.4	7.0	
	50	20.0 1050	.38			25	438.9	5.8	
	60	20.5 1050	.38			30	437.1	5.0	
	70	20.5 1050	.38			35	435.8	4.4	
	80	20.5 1050	.38			40	434.5	4.0	
	90	20.5 1050	.38			45	433.3	3.6	
	100	20.5 1050	.38			50	432.0	3.4	
	110	20.5 1050	.38			60	431.0	3.0	
	120	20.5 1050	.38	.38=202 gal/min		70	429.1	2.7	
		Depth				80	428.5	2.5	
	0		T/T'			90	427.6	2.33	
	1					100	426.5	2.2	
	2					110	425.9	2.09	
	3	430.2	41			120	425.2	2.0	
	4	438.5	31						
	5	440.7	25						
	6	442.0	21						
	7	445.1	18.1						
	8	450.0	16						
	9	450.3	14.3						
	10	449.0	13						

PUMP TEST DATA SHEET ; WELL NO. SG#10
at 960'

PUMPED WELL SG#10 OBSERVATION WELL ________

DATE: 6-11-74 STATIC WATER LEVEL 389'

PUMP (ON) (OFF) AT ________ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ______ CONDUCTIVITY ______ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP 6.33 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	1		121/1	121					
	2	442.00	122/2	61					
	3	421.75	123/3	41					
	4	409.00	124/4	31					
	5	404.40	125/5	25					
	6	401.70	126/6	21					
	7	399.60	127/7	18.1					
	8	398.30	128/8	16.					
	9	396.20	129/9	14.3			T= 176	g/d/ft.	
	10	395.20	130/10	13.0					
	12	391.70	132/12	11.0			T/T'=173	g/d/ft.	
	14	391.70	134/14	9.6					
	16	391.70	136/16	8.5					
	18	391.30	138/18	7.7					
	20	391.36	140/20	7.0					
	25	390.36	145/25	5.8					
	30	391.30	150/30	5.0					
	35	391.10	155/35	4.4					
	40	391.00	160/40	4.0					
	45	390.90	165/45	3.7					
	50	390.90	170/50	3.4					
	60	390.90	180/60	3.0					
	70	390.60	190/70	2.6					
	80	390.40	[illegible]	2.5					
	90	390.00	210/90	2.3					

PUMP TEST DATA SHEET ; WELL NO. SG #10 @ 1336

PUMPED WELL SG #10 OBSERVATION WELL —

DATE: JUNE 14, 1974 STATIC WATER LEVEL UNKNOWN

Max. pressure 425 psi

PUMP [✓ (ON)] (OFF) AT 4:00 P.M. (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ____ CONDUCTIVITY ____ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 20 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE		CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
4:00		Pumps ON		mhos	Flows				T/T'	52+42-94 min
4:08	08	water to surface	Temp. 23.5	900	.36	7:00	60	4:08 –	5:42	Jetting
4:20	20		23.	850	.38	7:10	70	391.10	164/70	2.34
4:35	35		23.	850	.45	7:20	80	390.60	174/80	2.2
4:50	50		23.	850	.47	7:30	90	390.30	184/90	2.04
5:05	65		23.	850	.48	7:40	100	389.75	194/100	1.94
5:20	80		23.	850	.48					
5:35	95		23.	850	.49					
5:40	100	Depth	23.	850	.49					
5:42	102	Pumps off	T/T'							
5:47	5	412.1	99/5	19.8						
5:48	6	404.7	100/6	16.7						
5:49	7	403.55	101/7	14.4						
5:50	8	399.8	102/8	12.7						
5:51	9	397.7	103/9	11.4						
5:52	10	395.85	104/10	10.4						
5:54	12	395.7	106/12	8.8						
6:56	14	398.3	108/14	7.7						
5:58	16	399.6	110/16	6.9						
6:00	18	399.2	112/18	6.2						
	20	398.7	114/20	5.7						
	25	396.9	119/25	4.8						
	30	396.35	124/30	4.1						
	35									
	40									

PUMP TEST DATA SHEET ; WELL NO. SG# 10
Depth : 1416'

PUMPED WELL SG# 10 OBSERVATION WELL ______

DATE: June 14, 1974 STATIC WATER LEVEL UNKNOWN

PUMP [✓ (ON)] (OFF) AT 4:00 A.M. (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP 7.0 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN	WATER LEVEL DEPTH BELOW MP		PUMP RATE		CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
4.00	0	Pumps on	Temp	MHos	Flow	6:32	52	395.4	157/52	3.0
4:09	9	Water to Surf.				6:37	57	394.2	162/57	2.84
4:10	10		21.5	920	.11	6:42	62	394.2	167/62	2.69
4:15	15		21.5	850	.24	6:47	67	393.6	172/67	2.57
4:30	30		21.5	850	.44	6:57	77	393.1	182/77	2.36
4:45	45		21.5	850	.50	7:07	87	392.8	192/87	2.21
5:00	60		22.	900	.53	7:17	97	392.3	202/97	2.08
5:15	75		22.	900	.53	7:27	107	391.8	212/107	1.98
5:30	90		22.	900	.54	7:37	117	391.3	222/117	1.90
5:35	95		22.	900	.53	7:47	127	391.2	232/127	1.83
5:40	105	Pumps off	T/T'							
5:54	14	371.2	119/14	8.5						
5:55	15		120/15	8.00						
5:56	16	382.1	121/16	7.56						
5:57	17	381.8	122/17	7.2				T = 3010	to	4400
5:58	18	376.8	123/18	6.8				T/T' = 2270		g/d/Ft.
5:59	19						Est.	Static w.l.		= 366'
6:01	20	391.2	125/20	6.25						
6:03	22	391.2	127/22	5.77						
6:05	24	413.1	129/24	5.4						
6:07	26	421.2	131/26	5.0						
6:09	28	423.3	133/28	4.75						
6:15	35	397.9	140/35	4.0						
6:20	40	396.8	145/40	3.6						
6:25	45	396.2	150/45	3.3						

SORGHUM GULCH #10

PUMP TEST DATA SHEET ; WELL NO. 10

pipe @ 1480'
pkr @ 1600'

PUMPED WELL ____________ OBSERVATION WELL 10

DATE: 7-19-79 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) [✓ NO]

MP = MEASURING POINT MP 70' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
5:30	0	°C m/c				70	17°C ±8000		11g/m
	↓					75	" "		"
						80	" "		"
	12	14.5° 1900		± 5g/m		85	" "		"
	13	14.5° 2300		± 8g/m		90	" "		"
	14	14.5° 4600		± 8g/m		95	" "		"
	15	14.5° 5000		shut down		100	" "		"
SHUT DOWN AND FLUSH						105	" "		"
						110	" "		"
9:00	0	IMPOUNDED WATER PIT				115	" "		"
	8	17°C ±8000				120	" "		"
	9 ← hole unloaded								
	11	15.5°C ±8000		± 5g/m			pH ±	6	
	14	16.5°C 1375		± 5g/m					
	17	16.5°C 3500		± 8g/m					
	22	16.5°C 5000		± 11g/m					
	25	16.5°C 6000		± 11g/m					
	30	16.5°C ± 8000		"					
	35	17°C ± 8000		"					
	40	17°C ± 8000		"					
	45	" "		"					
	50	" "		"					
	55	" "		"					
	60	" "		"					
	65	" "		"					

PUMP TEST DATA SHEET ; WELL NO. ________

PUMPED WELL __________ OBSERVATION WELL __________

DATE: ________ STATIC WATER LEVEL __________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ______ CONDUCTIVITY ______ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	RECOVERY								
		Time until water level reached							
		1000' measured from							
		+7.0 above	G.L.						
	15	915.7							
	16	910.2							
	18	910.65							
	20	890.6							
	25	779.3							
	30	712.0							
	35	620.5							
	40	547.2							
	45	508.8							
	50	498.1							
	60	458.3							
	70	437.6							
	80	426.1							
	90	411.3							
	100	390.2							

PUMP TEST DATA SHEET ; WELL NO. SG #10

Jet test @ 2211'

PUMPED WELL ____________ OBSERVATION WELL ____________

DATE: 6-30-74 STATIC WATER LEVEL ____________

PUMP [✓ (ON)] (OFF) AT 6:10 (DRAWDOWN) (RECOVERY) TEST

Set pipe open ended

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP 7.0 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
6:10		Air on	Temp	mhos Flow					
6:40			19.9	1100 .25	Heading up (Not getting all possible air)				
7:01			21.0	1000 .40	Steady H$_2$O Production				
7:10			21.	1000 .46					
7:25			21.	1025 .49		25	403.7	145/25	5.8
7:40			21.5	1400 .50		34	403.7	154/34	4.53
7:55			21.5	2100 .51		37	403.7	157/37	4.24
8:05			21.5	2100 .52		40	403.15	160/40	4.0
					8:55	45	402.90	165/45	3.66
8:10	0		T/T'		9:00	50	402.80	170/50	3.4
	1				9:10	60	402.40	180/60	3.0
	2				9:20	70	402.00	190/70	2.71
	3				9:30	80	401.60	200/80	2.5
	4	397.2			9:40	90	401.35	210/90	2.33
	5	—			9:50	100	401.20	220/101	2.2
	6	—				110			
	7	410.3				120			
	8	—							
	9	—							
	10	—							
	12	—							
	14	407.57	134/14	9.6					
	16	407.57	136/16	8.5					
	18	406.9	138/18	7.6					
	20	405.4	140/20	7.0					

PUMP TEST DATA SHEET ; WELL NO. 56 # 10-A
1333'

DEPTH 1333'

PUMPED WELL ______ OBSERVATION WELL ______

DATE: 7-10-74 STATIC WATER LEVEL ______

PUMP (ON) (OFF) AT ______ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY / SAMPLE TAKEN (YES) [✓ (NO)]

MP = MEASURING POINT MP 66' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
13:20	0	°C	Mhos		Flume.		16	414.4	8.5	
13:30	10	21	900		.17		18	414.4	7.6	
	20	21.5	975		.34		20	413.9	7.0	
	30	22.	1025		.38		25	413.5	5.8	
	40	22.	1025		.40		30	413.3	5.0	
	50	22.	1025		.42		35	413.0	4.4	
	60	22.	1025		.41		40	412.8	4.0	
	70	22.	1025		.42		45	411.4	3.6	
	80	22.	1025		.42		50	411.95	3.4	
	90	22.	1025		.42		60	411.25	3.0	
	100	22.	1025		.42		70	410.75	2.7	
	110	22.	1025		.42		80	409.8	2.5	
	120	22.	1025		.42		90	409.1	2.33	
	1			T/T'			100	409.0	2.2	
	2						110	408.5	2.09	
	3									
	4									
	5									
	6	437.65		21						
	7	427.30		18						
	8	424.30		16						
	9	421.70		14.3						
	10	420.70		13						
	12	416.3		11						
	14	415.5		9.5						

WATER TEST ← 808.1

PUMP TEST DATA SHEET ; WELL NO. ______

PUMPED WELL SG#11 ; OBSERVATION WELL —

DATE: JULY 26, 1974 STATIC WATER LEVEL UNKNOWN

PUMP [✓ (ON)] (OFF) AT 6:15 PM (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ______ CONDUCTIVITY ______ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE		CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
6:15	0	Pumps ON	Temp.	Mhos	Flume	38	18	393.4	11.3	
6:18	3	water to Surf.			Est .100	40	20	392.4	10.3	
6:20	5		14.5	1700	gal./min.	42	22	391.7	9.4	
6:35	20		15.	1600	.	44	24	391.2	8.7	
6:50	35		15.5	1525	.	46	26	391.0	8.1	
7:05	50		16.0	1475	.	51	31	391.0	7.0	
7:20	65		15.5	1375	.	56	36	390.0	6.1	
7:35	80	First H_2O out of	15.25	1325	.	10:01	41	389.3	5.5	
7:50	95	Flume @8:48PM	16.	1300	.10	:06	46	388.0	5.0	
8:05	110		16.	1250	.31	:11	51	386.8	4.6	
8:20	125		16.5	1250	.40	:21	61	384.6	4.0	
8:35	140		16.25	1200	.41	31	71	382.5	3.6	
8:50	155		16.	1200	.41	41	81	380.7	3.3	
9:05	170		16.	1200	.41	51	91	379.3	3.0	
9:20	0	Pumps off	15.5	1150	.41	11:01	101	377.8	2.8	
9:27	7	405.2		t/t' 27.9		11	111	376.4	2.7	
9:28	8	405.1		24.1		21	121			
9:29	9	404.9		21.6						
9:30	10	403.6		19.5						
9:31	11	402.2		17.8						
9:32	12	401.2		16.4						
9:33	13	399.9		15.2						
9:34	14	398.6		14.2						
9:35	15	396.6		13.3						
9:36	16	394.1		12.6						

[illegible] ≈ 868.0

PUMP TEST DATA SHEET ; WELL NO. SG#11

PUMPED WELL ________ OBSERVATION WELL 868. Depth

DATE: 7-27-74 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT 11:15 A.M. (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ____ CONDUCTIVITY ____ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP 5 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
11:15	0	Pumps on			:44	25	385.1	5.8	
11:19	4	TEMP MHOS		FLUME	:49	30	394.8	5.0	
11:20	5	16.5 1500			:54	35	411.6	4.4	
:35	20	17.0 1300		.14	:59	40	409.3	4.0	
:50	35	17. 1150		.30	2:04	45	407.9	3.7	
12:05	50	17. 1050		.37	:09	50	407.5	3.4	
:20	65	17. 1025		.40	:14	55	405.9	3.2	
:35	80	17.5 900		.40	:24	65	403.7	2.85	
:50	95	17. 950		.40	:34	75	401.8	2.6	
1:05	110	17. 950		.40	:44	85	399.8	2.4	
1:20	0	17. 950		.40	:54	95	398.2	2.26	
:25	5	313.0			3:04	105	396.9	2.14	
26	6	321.4			:14	115	395.6	2.09	
27	7	332.3			:24	125	394.1	1.96	
28	8	334.5							
29	9	346.5							
30	10								
31	11	359.8							
32	12	365.2							
33	13								
34	15	367.5							
36	17	369.0							
38	19	372.9							
40	21	377.							
42	23	382.2							

Mahogany Ledge for Mine Roof ≃ 1330

PUMP TEST DATA SHEET ; WELL NO. Sorghum Gulch #11

PUMPED WELL ______ ; OBSERVATION WELL ______

DATE: Aug. 9, 1974 STATIC WATER LEVEL ______

PUMP [✓ ON] (OFF) AT 3:30 a.m. (DRAWDOWN) [✓ RECOVERY] TEST

WATER TEMP. ______ CONDUCTIVITY ______ SAMPLE TAKEN [✓ YES] (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
3:30	0	Temp	Conduc	flums		5:55	25	422.4		
	10	17.0	1550	.22			26	422.2		5.61
	20	18.0	1300	.38			27	422.2		5.44
	30	19.5	1010	.50			29	421.9		5.14
	40	20.0	1005	.58			31	421.6		4.87
	50	20.0	1005	.61			33	421.3		4.64
	60	20.0	1005	.58			35	421.2		4.4
	70	20.0	1005	.56			37	421.0		4.24
	80	20.0	1005	.55			39	420.7		4.08
	90	20.0	1005	.56			41	420.5		3.93
	100	20.0	1005	.56			43	420.3		3.79
	110	20.0	1005	.55			45	420.1		3.67
	120						50	419.8		3.4
		Depth			T/T'		55	419.4		3.2
5:41	11	426.7			11.9		60	419.1		3.0
	14	425.1			9.6		65	418.9		2.85
	15	427.2			9.0		70	418.5		2.71
	16	425.0			8.5		75	418.3		2.6
	17	424.2			8.1		85	417.8		2.42
	18	424.2			7.7		95	417.8		2.26
	19	423.7			7.3		105	416.9		2.14
	20	423.5			7.0		115	416.3		2.04
	21	423.0			6.7		125	415.9		1.96
	22	422.8			6.45					
	24	422.5			6.0					

WATER TEST @MINE FLOOR = 1385

PUMP TEST DATA SHEET ; WELL NO. SG#11

PUMPED WELL ________ OBSERVATION WELL ________

DATE: Aug. 9-1974 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT ________ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP 5 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	0	TEMP. °C MHOS		FLUME		16	424.7	8.5	
	10	15° 1600		.14		18	424.1	7.7	
	20	17° 1425		.30		20	423.3	7.0	
	30	20° 1200		.44		25	422.4	5.8	
	40	20° 1075		.49		30	421.8	5.0	
	50	20° 1050		.52		35	421.2	4.4	
	60	20° 1050		.54		40	420.4	4.0	
	70	20° 1050		.55		45	419.8	3.7	
	80	20° 1050		.55		50	419.3	3.4	
	90	20° 1050		.55		60	418.7	3.0	
	100	20° 1050		.55		70	418.3	2.71	
	110	20° 1050		.55		80	417.5	2.5	
	120	Pumps OFF				90	417.1	2.33	
	1					100	416.6	2.2	
	2	WATER				110	416.60	2.09	
	3	LEVEL	T/T'			120	415.6	2.0	
	4								
	5								
	6	429.8	21						
	7	429.2	18						
	8	428.6	16						
	9	428.	143						
	10	427.5	13.						
	12	426.5	11.						
	14	425.6	9.6						

Base of "B" Groove at 1490'

PUMP TEST DATA SHEET ; WELL NO. SG-11

PUMPED WELL SG-11 OBSERVATION WELL ________

DATE: 8/12/74 STATIC WATER LEVEL ________

PUMP [✓ ON] (OFF) AT 9:10
off 11:40
~~(DRAWDOWN)~~ [✓ RECOVERY] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ YES] (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	Temp	WATER LEVEL conduct DEPTH BELOW MP	Flow	PUMP RATE
	0				
	10	22°C	1200	.10	
	20	21°	1300	.28	
	30	21°	1250	.41	
	40	21.5°	1250	.50	
	50	21.5°	1250	.45	
	60	21.5°	1250	.43	
	70	21°	1250	.45	
	80	21°	1250	.42	
	90	21°	1250	.40	
	100	21°	1250	.43	
	110	21°	1250	.42	
	120	21.5°	1200	.40	
	130	21.5°	1200	.40	
	140	21.5°	1200	.40	
	150	21.5°	1200	.40	
	2				
	3			t/t'	
	4			↓	
	5		427.45	155/5	31
	6		426.60	156/6	26
	7		425.70	157/7	22.4
	8		424.60	158/8	19.75
	9		424.00	159/9	17.66
	10		423.50	160/10	16

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	11	424.20	161/11	14.6
	12	423.80	162/12	13.5
	13	422.80	163/13	12.5
	14	No Reading	164/14	
	15	421.90	165/15	11.
	17	420.80	167/17	9.8
	19	420.60	169/19	8.9
	21	419.70	171/21	8.1
	23	419.10	173/23	7.5
	25	419.00	175/25	7.0
	30	418.40	180/30	6.0
	35	417.60	185/35	5.3
	40	417.50	190/40	4.75
	45	416.90	195/45	4.33
	50	416.10	200/50	4.0
	55	415.70	205/55	3.73
	65	414.70	215/65	3.31
	75	414.00	225/75	3.0
	85	413.40	235/85	2.76
	95	413.00	245/95	2.58
	105	412.40	255/105	2.43
	115	412.10	265/115	2.30
	125	411.80	275/125	2.2

NEAR TOP OF GARDEN GULCH @ 2465

PUMP TEST DATA SHEET ; WELL NO. SG#11

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 8-26-74 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE
		°C	µΩ		3" Flume
	10	19.5	2000		.22
	20	22.0	1600		.46
	30	22.5	2300		.58
	40	22.5	2600		.65
	50	23.	2400		.67
	60	22.5	2200		.69
	70	22.5	2200		.65
	80	23.	2000		.55
	90	23.	2100		.62
	100	23.	2050		.65
	110	23.	2050		.66
	120	23.	2050		.66
	130	23.	2050		.67
	0				
	1	WATER			
	2	LEVEL		T/T'	
	3				
	4				
	5	436.6		27	
	6	435.7		22.7	
	7	434.5		19.6	
	8	433.3		17.3	
	9	432.2		15.9	
	10	431.0		14	

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
	11	431.6	12.8	
	12	431.8	11.8	
	14	430.4	10.3	
	16	428.0	9.1	
	18	426.5	8.2	
	20	431.5	7.5	
	25	431.4	6.2	
	30	430.1	5.3	
	35	430.0	4.7	
	40	428.2	4.3	
	45	429.6	3.9	
	50	429.1	3.6	
	55	428.6	3.4	
	60	428.5	3.2	
	70	427.4	2.9	
	80	427.2	2.6	
	90	426.4	2.4	
	100	425.8	2.3	
	110	425.4	2.2	

PUMP TEST DATA SHEET ; WELL NO. SG#11

TD. 2825±

PUMPED WELL ________ ; OBSERVATION WELL ________

DATE: 9-1-74 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	T/T'
		µΩ	°C		Flume		1		90	424.5	3.7
	10	2000	18.5		.28		2		100	424.	3.
	20	1850	19.0		.39		3		110	423.6	3.
	30	1750	19.5		.45		4		120	423.2	3.1
	40	1700	19.0		.48	T/T'	5		130		
	50	1600	19.5		.49		6				
	60	1600	20.		.50	35.3	7	426.8			
	70	1550	20.		.50	31.	8	425.2			
	80	1500	20.		.50	27.7	9	427.9			
	90	1500	20.		.50	25	10	427.9			
	100	1450	20.		.50	21	12	427.1			
	110	1450	20.		.50	18.1	19	427.9			
	120	1400	20.		Filling Water	16	16	427.8			
	130	1400	20.		Truck OFF	14.3	18	427.7			
	140	1425	20.		.45	13.	20	427.8			
	150	1500	20.		.46	10.6	25	427.4			
	160	1650	20.		.47	9	30	427.9			
	170	1900	20.		.48	7.9	35	427.7			
	180	2000	20.5		.48	7.	40	427.4			
	190	2100	20.		.48	6.3	45	427.0			
	200	2200	20.		.48	5.8	50	426.0			
	210	2250	20.		.48	5.4	55	426.4			
	220	2250	20.		.48	5.	60	426.1			
	230	2250	20		.48	4.4	70	425.0			
	240					4	80	424.7			

ARCO ET. AL., JETTING TEST TOP OF PARACHUTE CR.

PUMP TEST DATA SHEET ; WELL NO. 56 #18
@ 960'

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 10-1-74 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ YES] (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
	0	14°C	900 mΩ		Flume .12		12	578.9	11	
	10	15	800		.15		14	572.6	9.5	
	20	15	800		.13		16	568.2	8.5	
	30	15	800		.13		18	564.0	7.6	
	40	15	800		.13		20	559.7	7.0	
	50	15	800		.13		25	553.0	5.8	
	60	15	800		.13		30	547.5	5.0	
	70	15	750		.13		35	542.0	4.4	
	80	15	800		.13		40	538.4	4.0	
	90	15	800		.13		45	534.8	3.7	
	100	15	800		.13		50	531.3	3.4	
	110	15	800		.13		55	528.2	3.2	
	120	15	800		.13		60	526.0	3.0	
							70	522.	2.7	
	0	WTR. LEVEL		T/T'			80	517.7	2.5	
	1						90	514.	2.3	
	2						100	511.	2.2	
	3						110	508.5	2.1	
	4						120	506.3	2.0	
	5	634.1		25						
	6	611.3		21				T = 76 g/d/ft.		
	7	603.3		18				T/T' = 52 g/d/ft		
	8	597.3		16						
	9	591.9		14						
	10	586.2		13						

PUMP TEST DATA SHEET ; WELL NO. SG#18
@1426'

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 5-10-74 STATIC WATER LEVEL ________

PUMP [✓ (ON)] (OFF) AT 4:00 Pm. (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 7 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
4:00	0	WTR. TEMP.	CONDUCT.		FlUME		12	552.8	11	
	10	19	700		.32		14	551.9	9.5	
	20	20	700		.41		16	550.5	8.5	
	30	20	750		.45		18	549.5	7.6	
	40	20	750		.45		20	548.5	7.0	
	50	20	700		.45		25	546.5	5.8	
	60	20.5	700		.45		30	545.5	5.0	
	70	20.5	750		.45		35	543.6	4.4	
	80	20.5	750		.45		40	542.5	4.0	
	90	20.5	750		.45		45	541.7	3.7	
	100	20.5	750		.45		50	540.9	3.4	
	110	20.5	750		.45		60	539.5	3.0	
6:00	120	20.5	750		.45		70	538.3	2.7	
							80	537.3	2.5	
6:00	0			T/T'			90	536.4	2.3	
	1						100	535.6	2.2	
	2						110	534.8	2.1	
	3	562.1		41		8:00	120	534.0	2.0	
	4	560.3		31						
	5	559.3		25						
	6	558.5		21						
	7	557.3		18						
	8	556.2		16						
	9	555.		14						
	10	554.6		13						

JETTING TEST @ T.D. 1330'

PUMP TEST DATA SHEET ; WELL NO. SG#18-A

PUMPED WELL ________ OBSERVATION WELL ________

DATE: 10-18-74 STATIC WATER LEVEL ________

PUMP (ON) (OFF) AT ________ (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ YES] (NO)

MP = MEASURING POINT MP ____ FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
	0	20°C 700 μ-Ω		.24 Flume Reads		12	556.6	11.0	
	10	20 700		.32		14	555.1	9.5	
	20	20 700		.35		16	553.5	8.5	
	30	20 700		.36		18	552.0	7.6	
	40	20 700		.37		20	550.2	7.0	
	50	20 700		.38		25	547.6	5.8	
	60	20 700		.38		30	544.5	5.0	
	70	20 700		.38		35	542.6	4.4	
	80	20 700		.38		40	541.0	4.0	
	90	20 700		.38		45	539.6	3.7	
	100	20 700		.38		50	538.6	3.4	
	110	20 700		.38		55	537.0	3.2	
	120	20 700		.38 = 100 g/m		60	536.2	3.0	
		WATER LEVEL BELOW M.P.	T/T'			70	534.4	2.7	
	0					80	532.9	2.5	
	1					90	531.5	2.3	
	2					100	530.5	2.2	
	3					110	529.5	2.1	
	4					120	528.5	2.0	
	5	562.8	25						
	6	559.9	21						
	7	559.9	18						
	8	558.4	16						
	9	557.6	14.3						
	10	557.9	13.0						

TOP PARACHUTE CR. @ 466'

PUMP TEST DATA SHEET ; WELL NO. SG#19

PUMPED WELL ______ OBSERVATION WELL ______

DATE: ______ STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 1712 (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP ___ FT. ABOVE G.L.(GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP		PUMP RATE
1712	0	TEMP.	CONDUC.		FLUME			DEPTH	T/T'	
	10	13.5	750		.45		12	52.5	11	
	20	13.5	750		.52		14	51.9	9.5	
	30	13.5	750		.53		16	51.3	8.5	
	40	14.	750		.55		18	50.9	7.6	
	50	13.	800		.55		20	49.9	7.0	
	60	13.	750		.54		25	49.4	5.8	
	70	13	800		.55		30	49.0	5.0	
	80	12.5	800		.55		35	48.5	4.4	
	90	12.5	800		.55		40	48.1	4.0	
	100	12.5	800		.55		45	47.8	3.66	
	110	12.	800		.55		50	47.6	3.4	
	120	12	800		.55		60	47.0	3.0	
							70	46.7	2.7	
	0	DEPTH		T/T'			80	46.1	2.5	
	1						90	46.0	2.3	
	2						100	45.7	2.2	
	3						110	45.5	2.1	
	4						120	45.2	2.0	
	5									
	6	73.2		21						
	7	60.3		18						
	8	55.7		16						
	9	53.8		14.3						
	10	53.		13						

[illegible] POINT

TOTAL DEPTH @ 930'

PUMP TEST DATA SHEET ; WELL NO. SG#19

PUMPED WELL ______ OBSERVATION WELL ______

DATE: 9-23-74 STATIC WATER LEVEL ______

PUMP [✓ (ON)] (OFF) AT 22:45 (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] (NO)

MP = MEASURING POINT MP 6'6" FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
	0	TEMP.	CONDUC		FLUME		12	26.	11.	
	10	20.5	2600		.69		14	25.8	9.5	
	20	20.5	2800		.72		16	25.3	8.5	
	30	21.	2800		.72		18	25.4	7.6	
	40	21.	2800		.72		20	25.2	7.0	
	50	21.	2800		.72		25	24.6	5.8	
	60	20.5	2700		.72		30	24.0	5.0	
	70	20.5	2700		.72		35	23.2	4.4	
	80	20.5	2700		.72		40	23.4	4.0	
	90	20.5	2700		.72		45	23.1	3.7	
	100	20.5	2600		.72		50	22.7	3.4	
	110	20	2600		.72		60	22.2	3.0	
	120	20	2600		.72		70	21.6	2.7	
							80	21.	2.5	
	0	DEPTH		T/T'			90	20.5	2.3	
	1						100	20.0	2.2	
	2						110	20.0	2.1	
	3	24.4		41			120	19.4	2.0	
	4	23.9		31						
	5	23.8		25						
	6	24.8		21						
	7	25.5		18						
	8	25.6		16						
	9	25.5		14.3						
	10	25.7		13						

PUMP TEST DATA SHEET ; WELL NO. SC #19 @980.5'

PUMPED WELL ____________ OBSERVATION WELL ____________

DATE: 9-27-74 STATIC WATER LEVEL ____________

PUMP [✓ (ON)] (OFF) AT 9:00 AM (DRAWDOWN) (RECOVERY) TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN (YES) (NO)

MP = MEASURING POINT MP 5 FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP			PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
9:00	0	TEMP.	CONDUC.		FLUME		12	24.6	11.	
	10	20	2800		.6		14	24.	9.5	
	20	20	2800		.64		16	23.15	8.5	
	30	20	2800		.64		18	22.85	7.6	
	40	20	2800		.64		20	22.5	7.0	
	50	20	2800		.59		25	22.65	5.8	
	60	20	2800		.58		30	22.60	5.0	
	70	21	2760		.56		35	22.55	4.4	
	80	21	2700		.56		40	21.95	4.0	
	90	21	2650		.56		45	21.5	3.7	
	100	21	2600		.56		50	21.35	3.4	
	110	21	2600		.56		60	20.15	3.0	
	120	20	2600		.56		70	20.00	2.7	
							80	19.55	2.5	
	0	DEPTH		T/T'			90	19.30	2.3	
	1						100	19.05	2.2	
	2	16.7		61			110	18.80	2.1	
	3	18.15		41			120	18.35	2.0	
	4	16.7		31						
	5	15.35		25						
	6	14.85		21						
	7	15.30		18						
	8	16.40		16						
	9	16.20		19.3						
	10	17.20		13						

Top of Parachute Creek 890'

PUMP TEST DATA SHEET ; WELL NO. Cb-2B

PUMPED WELL Cb-2B OBSERVATION WELL Cb-2

DATE: 8/26/74

STATIC WATER LEVEL ____
observation well 250.3'

PUMP (ON) ~~(OFF)~~ AT 1020
off at 1220

~~(DRAWDOWN)~~ [✓ (RECOVERY)] TEST

WATER TEMP. ✓ CONDUCTIVITY ✓ SAMPLE TAKEN [✓ (YES)] ~~(NO)~~

MP = MEASURING POINT MP 4.5' FT. ABOVE G.L. (GROUND LEVEL)

CLOCK TIME	TIME IN MIN.	Temp WATER-LEVEL DEPTH-BELOW-MP Conduct	Flow	PUMP RATE	CLOCK TIME	TIME IN MIN.	WATER LEVEL DEPTH BELOW MP	T/T'	PUMP RATE
1020	0		Set up			12	426.4	12/132	11
	10	15° 1350	"			14	408.5		9.5
	20	15° 1350	"			16	390.0		8.5
	30	15.5° 1400	"			18	377.2		7.6
	40	15.5° 1300	"			20	368.6		7.0
	50	15.5° 1350	25± gpm			25	360.0		5.8
	60	16.0° 1350	25±			30	354.2		5.0
	70	16.0° 1300	"			35	352.3		4.4
	80	16.0° 1350	"			40	350.8		4.0
	90	16.0° 1350	"			45	349.7		3.66
	100	16.0° 1350	"			50	348.8		3.4
	110	15.5° 1350	"			60	347.3		3.0
	120	15.5° 1350	"			70	346.1		2.7
						80	345.0		2.5
		Water Level Below M.P.	T/T'			90	344.2		2.33
	1					100	343.4		2.2
	2					110	342.3		2.09
	3					120	341.2		2.0
	4	582.6	4/124	31					
	5	556.0		25					
	6	534.5		21					
	7	512.0		18					
	8	491.5		16					
	9	471.0		14.3					
	10	452.6		13					

Drilling Water Production

Drilling Water Production Data

During the drilling of wells and coreholes on and adjacent to Tract C-b, records were kept of drilling water production data. The records included produced water temperature and specific conductivity as well as produced and injected water volumes. Such readings were taken at approximately 30 foot intervals. This data is included in raw form in this section of the report.

The conductivity, temperature and discharged water volume per well have been graphed vs. depth - and the graphs included in this section as Figures III B-2 thru III B-15.

Samples of the produced drilling water were also taken from specificed intervals during drilling and analyzed for numerous water quality parameters. Results from this program are presented in the section of the report entitled Drilling Water Quality.

AQUIFER TEST-1

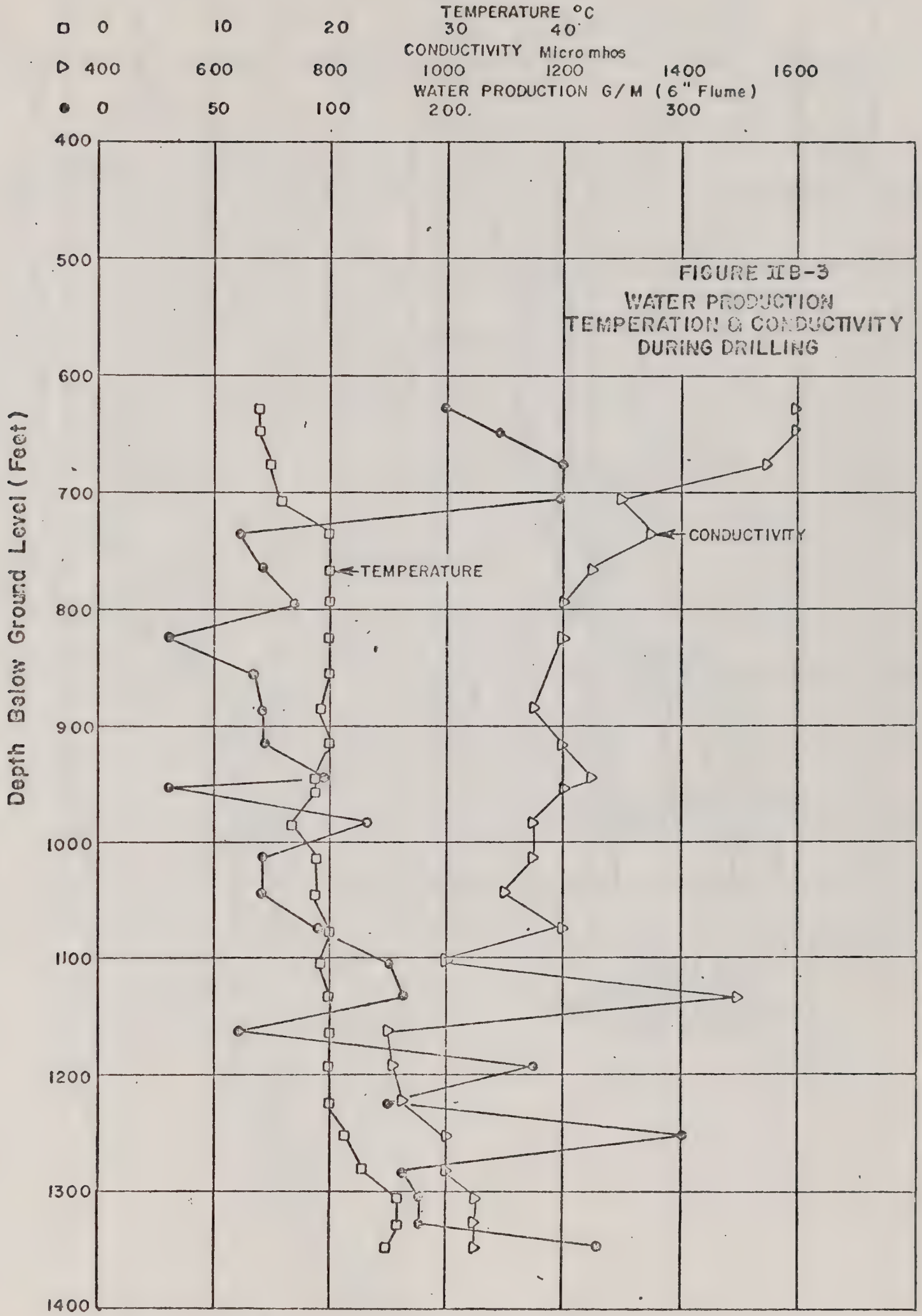


FIGURE IIB-3
WATER PRODUCTION
TEMPERATION & CONDUCTIVITY
DURING DRILLING

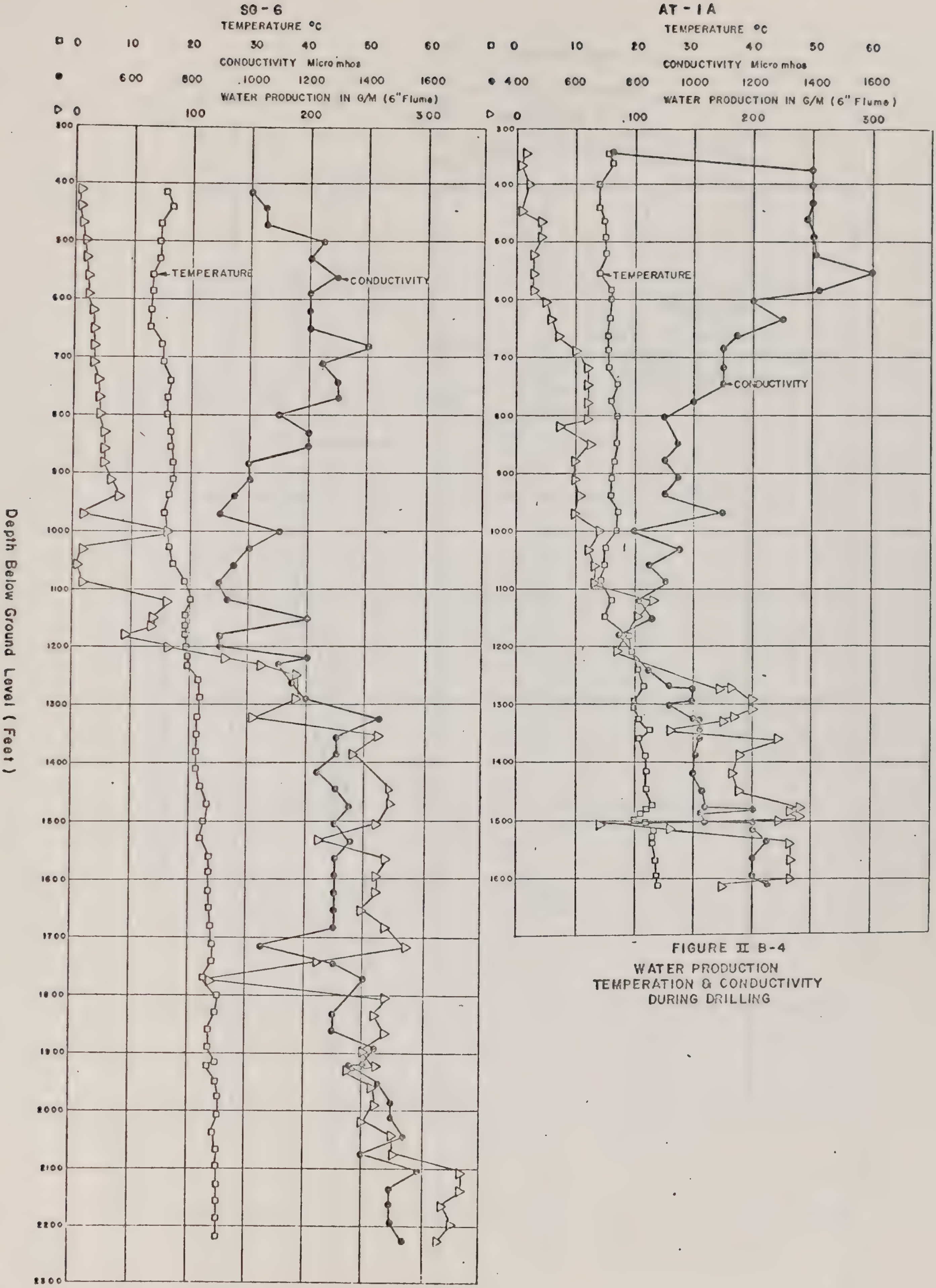


FIGURE II B-4
WATER PRODUCTION
TEMPERATION & CONDUCTIVITY
DURING DRILLING

AQUIFER TEST-I-AI

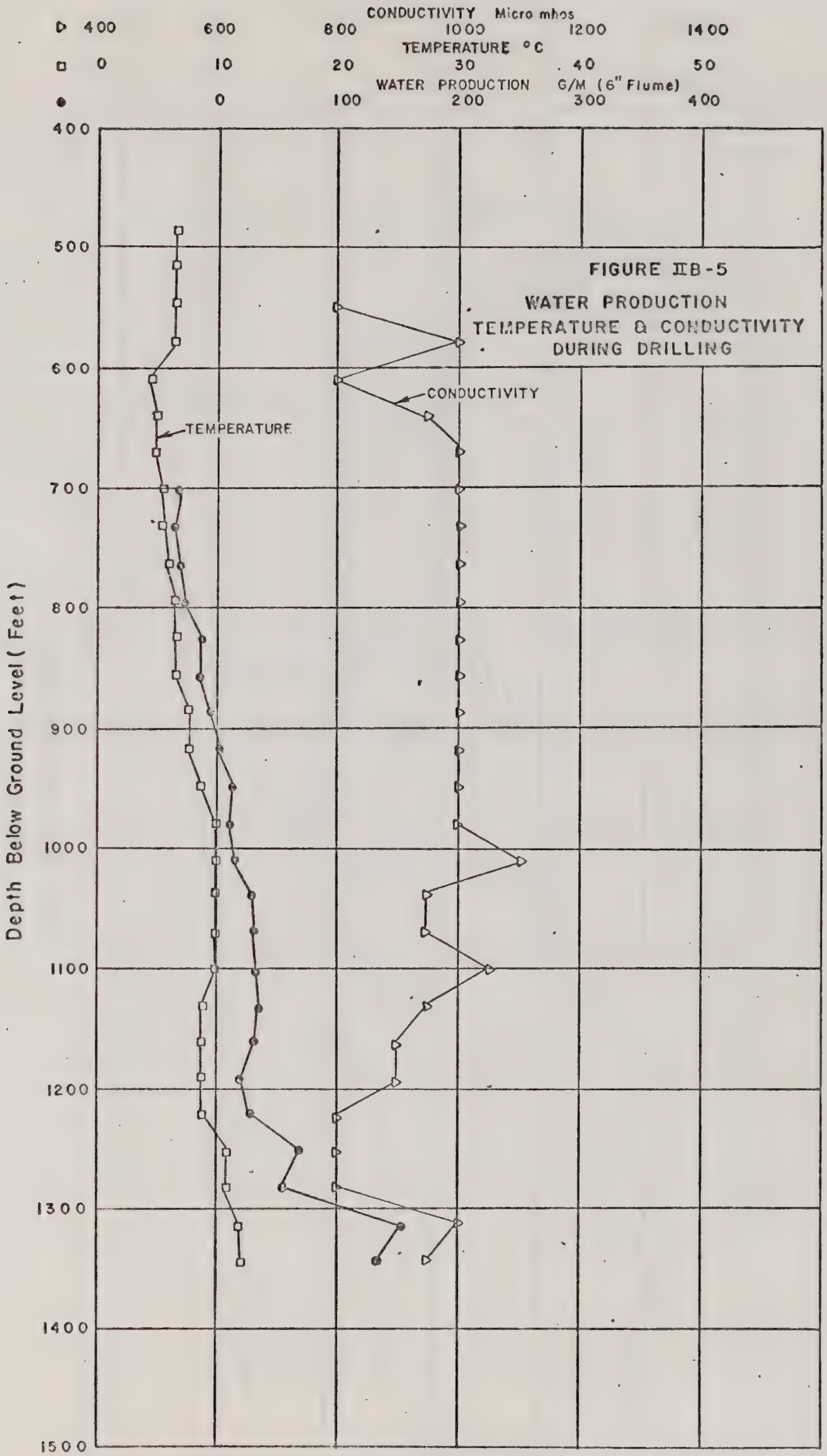


FIGURE IIB-5
WATER PRODUCTION
TEMPERATURE & CONDUCTIVITY
DURING DRILLING

AQUIFER TEST-1B

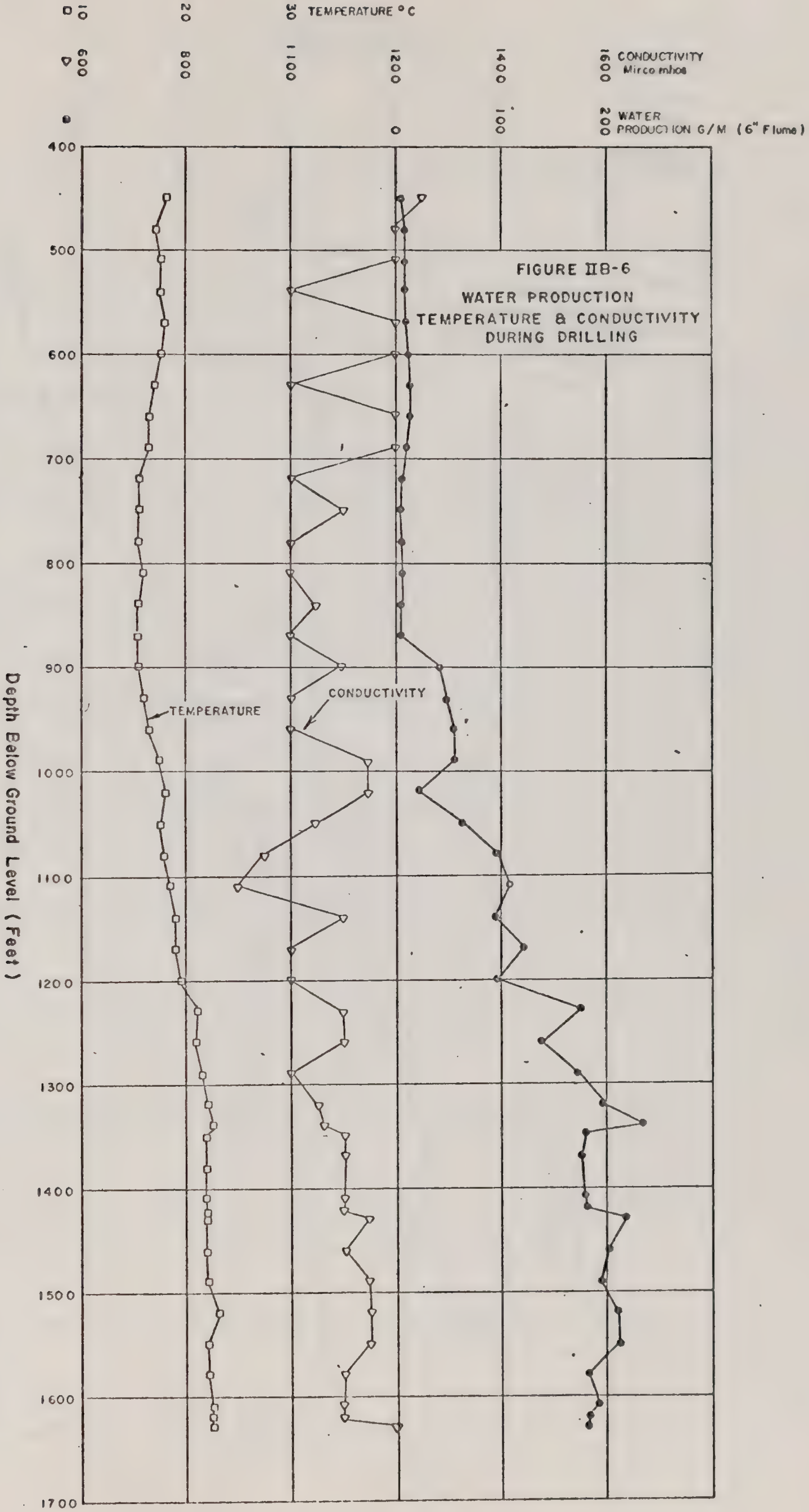
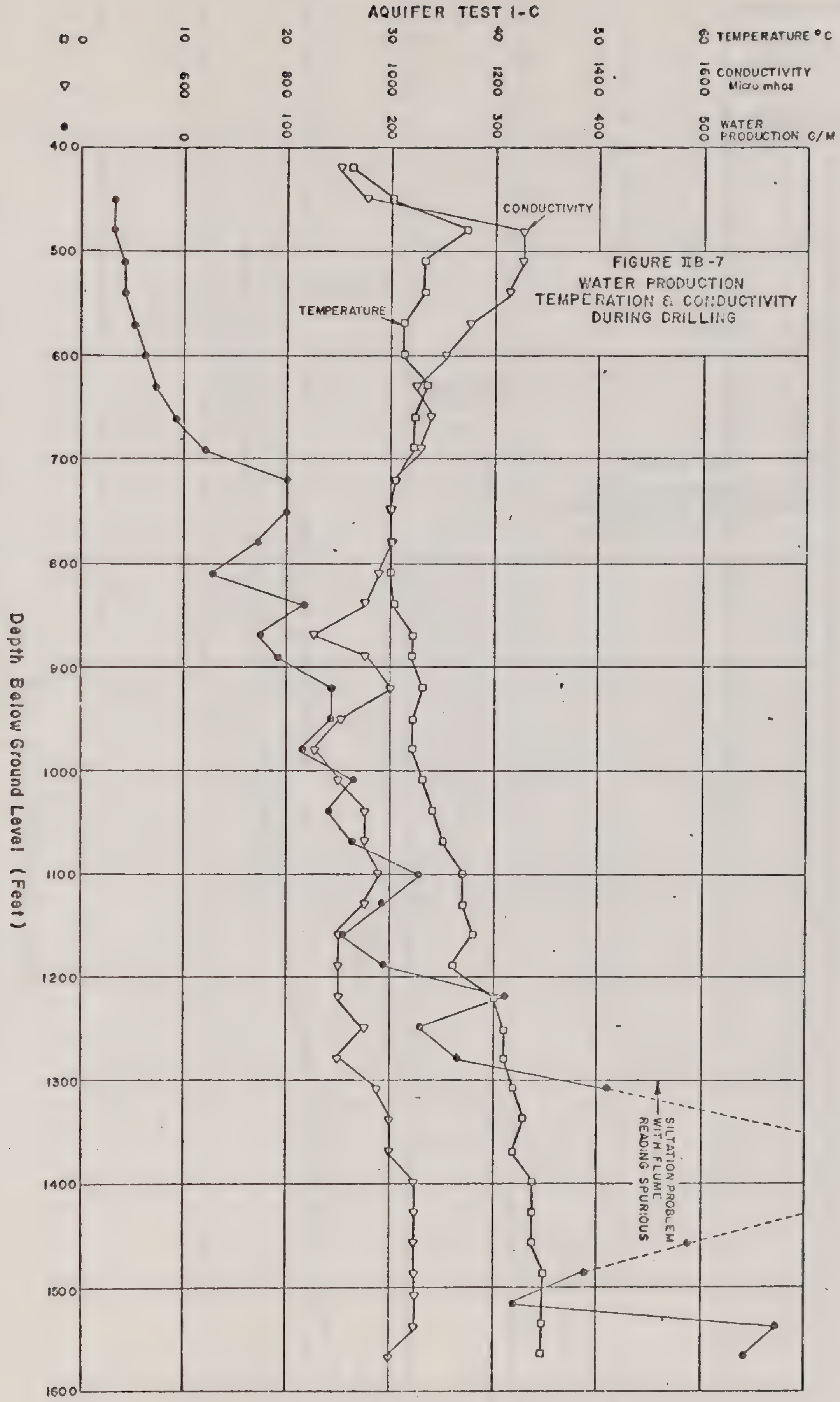


FIGURE IIB-6
WATER PRODUCTION
TEMPERATURE & CONDUCTIVITY
DURING DRILLING



AQUIFER TEST I-C

FIGURE IIB-7
WATER PRODUCTION
TEMPERATION & CONDUCTIVITY
DURING DRILLING

AQUIFER TEST I-D

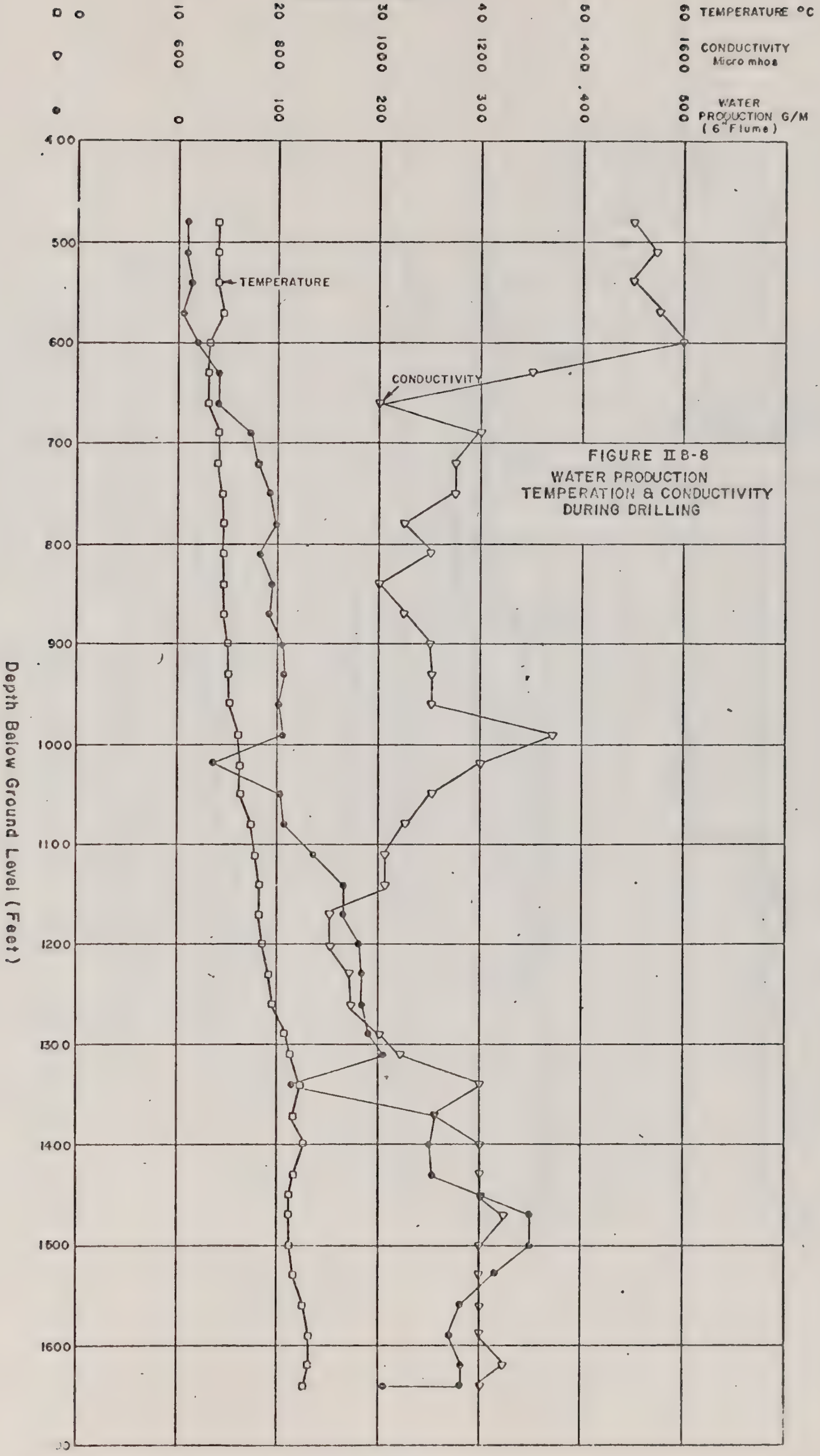


FIGURE II B-8
WATER PRODUCTION
TEMPERATION & CONDUCTIVITY
DURING DRILLING

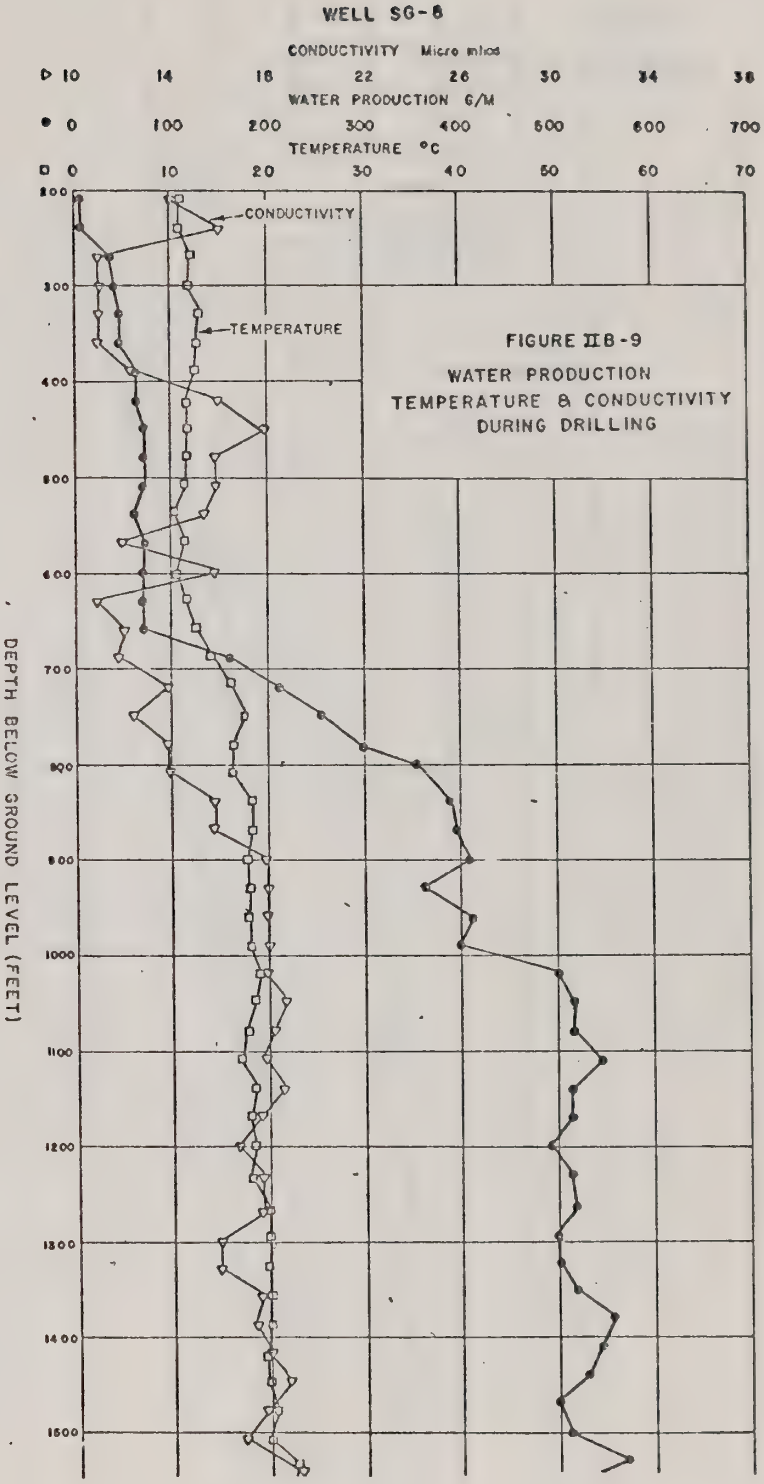


FIGURE IIB-9
WATER PRODUCTION
TEMPERATURE & CONDUCTIVITY
DURING DRILLING

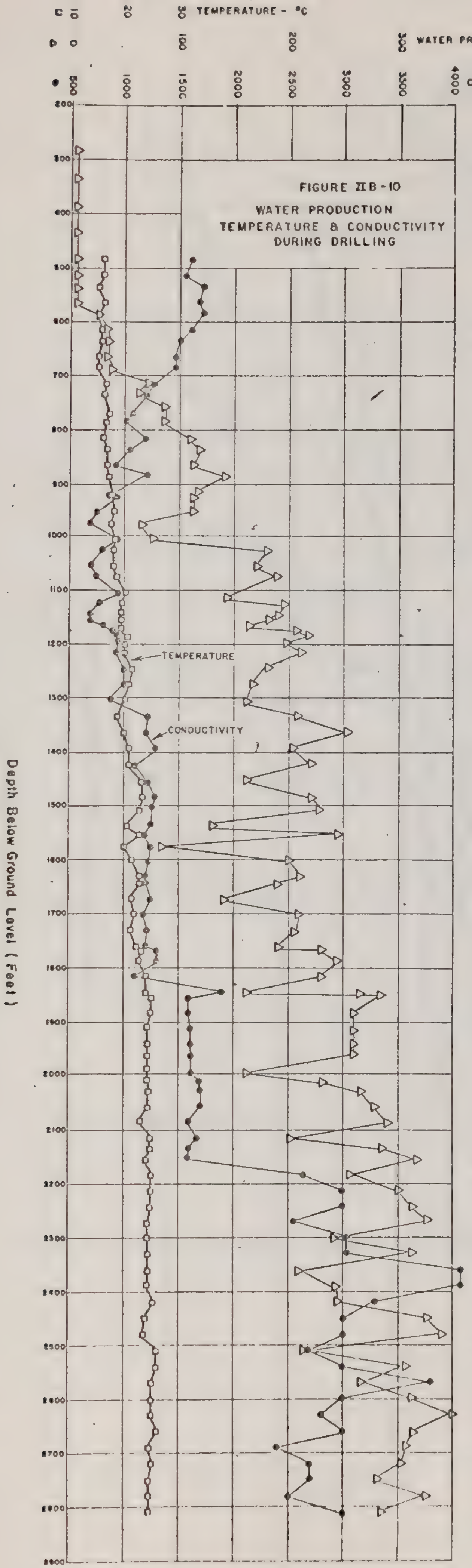
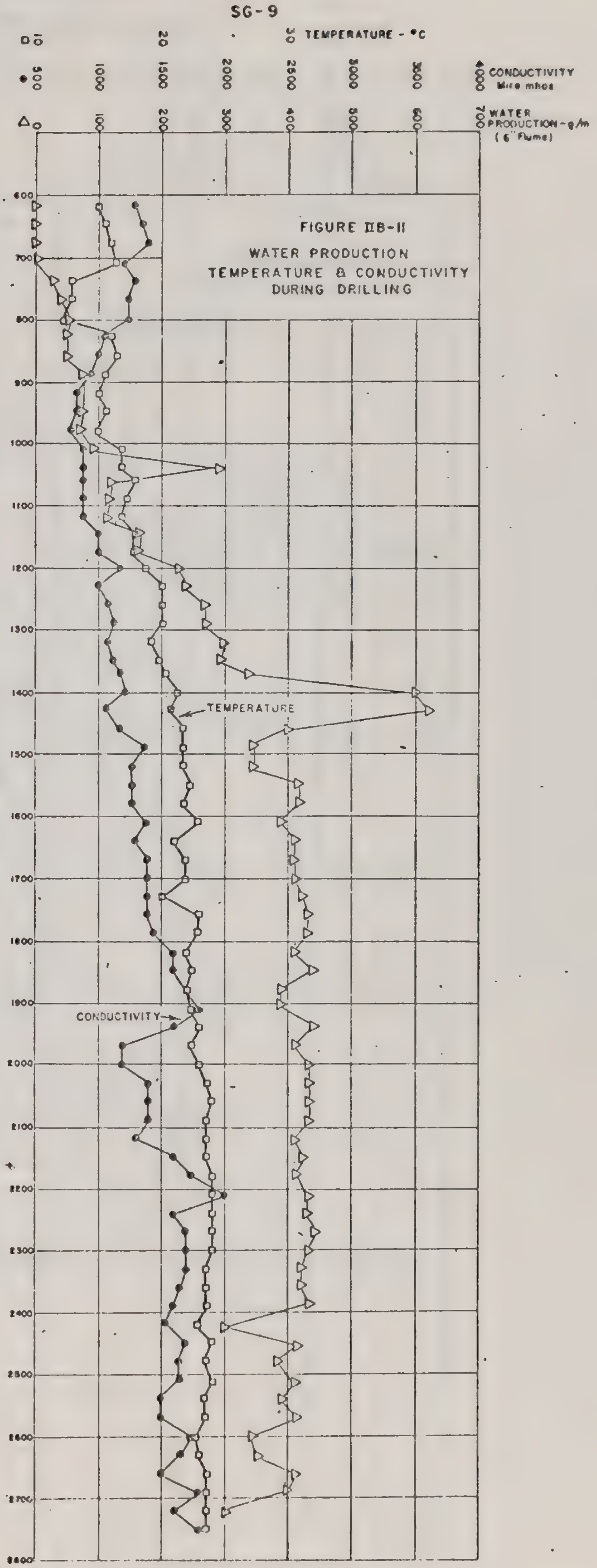


FIGURE IIB-10

WATER PRODUCTION TEMPERATURE & CONDUCTIVITY DURING DRILLING



SG-9

FIGURE IIB-11

WATER PRODUCTION TEMPERATURE & CONDUCTIVITY DURING DRILLING

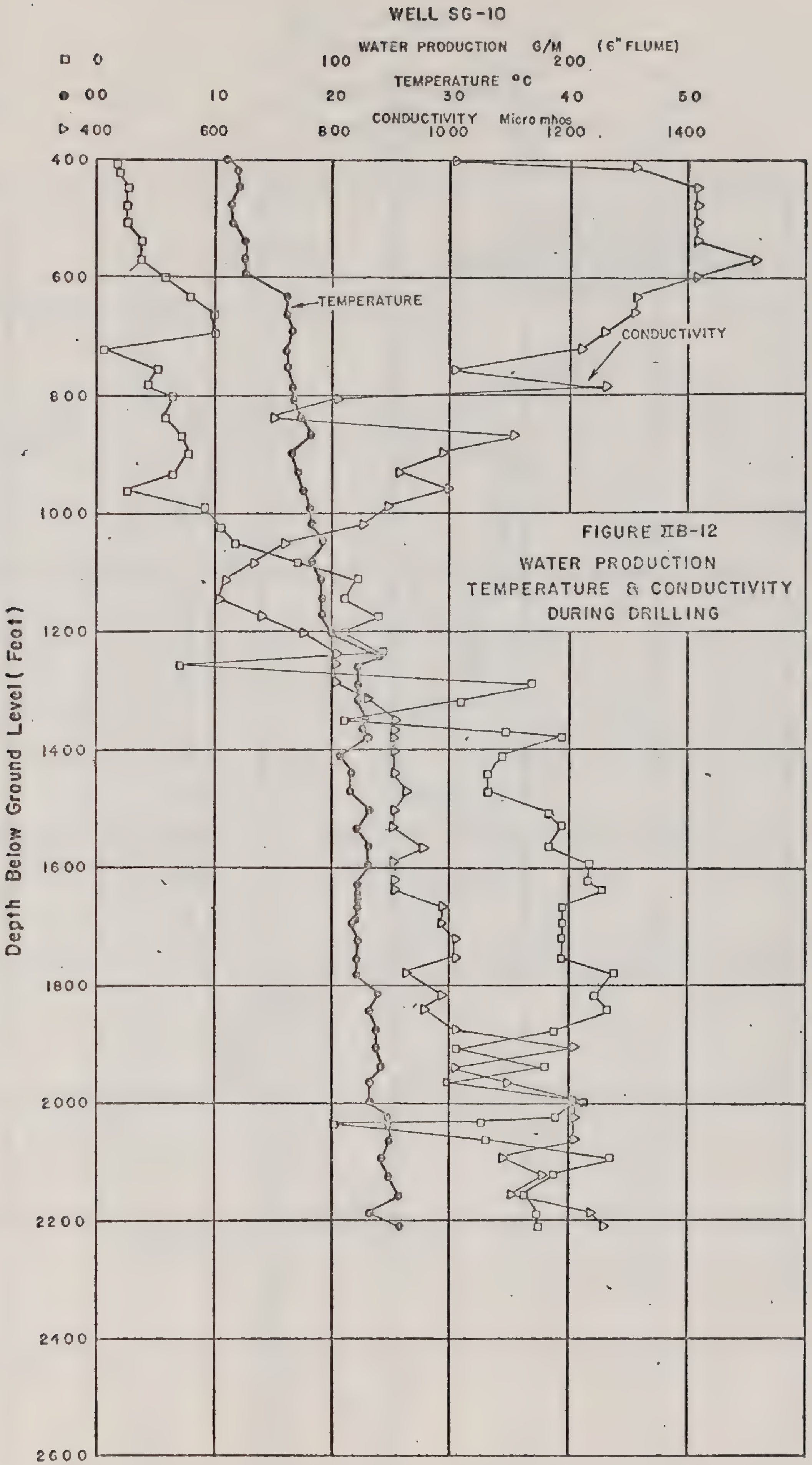


FIGURE IIB-12
WATER PRODUCTION
TEMPERATURE & CONDUCTIVITY
DURING DRILLING

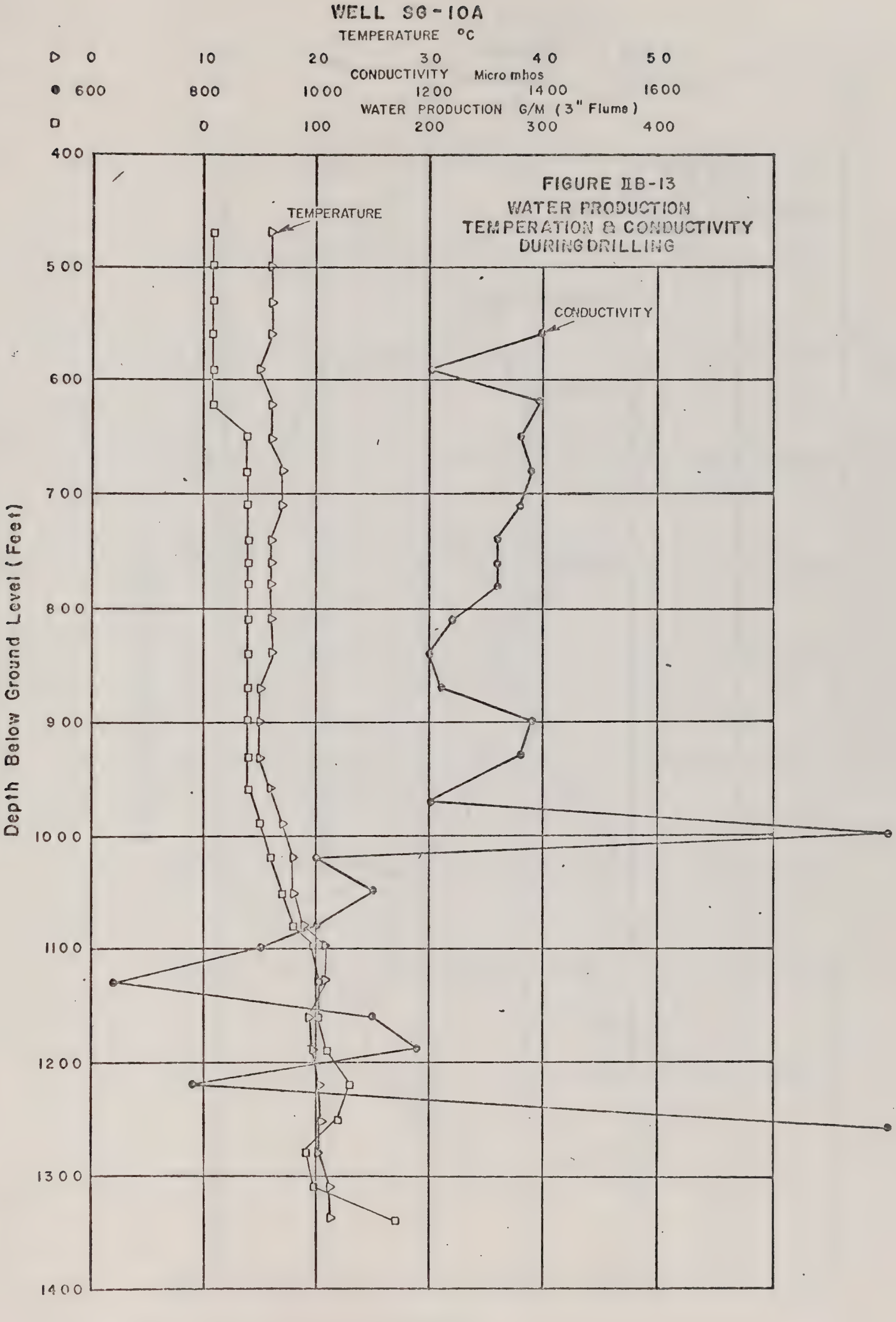


FIGURE IIB-13
WATER PRODUCTION
TEMPERATION & CONDUCTIVITY
DURING DRILLING

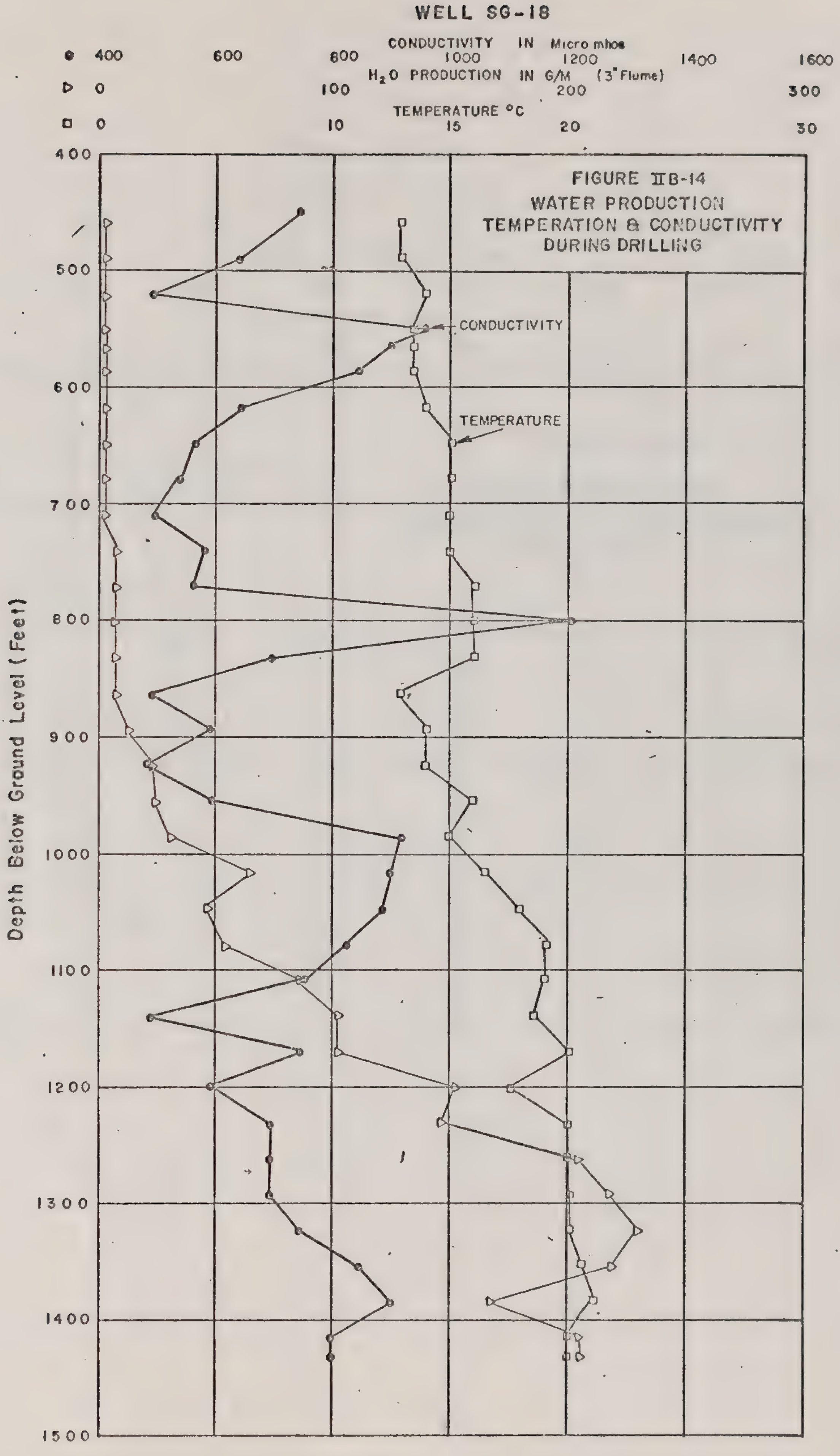


FIGURE IIB-14
WATER PRODUCTION
TEMPERATION & CONDUCTIVITY
DURING DRILLING

WELL SG-18A

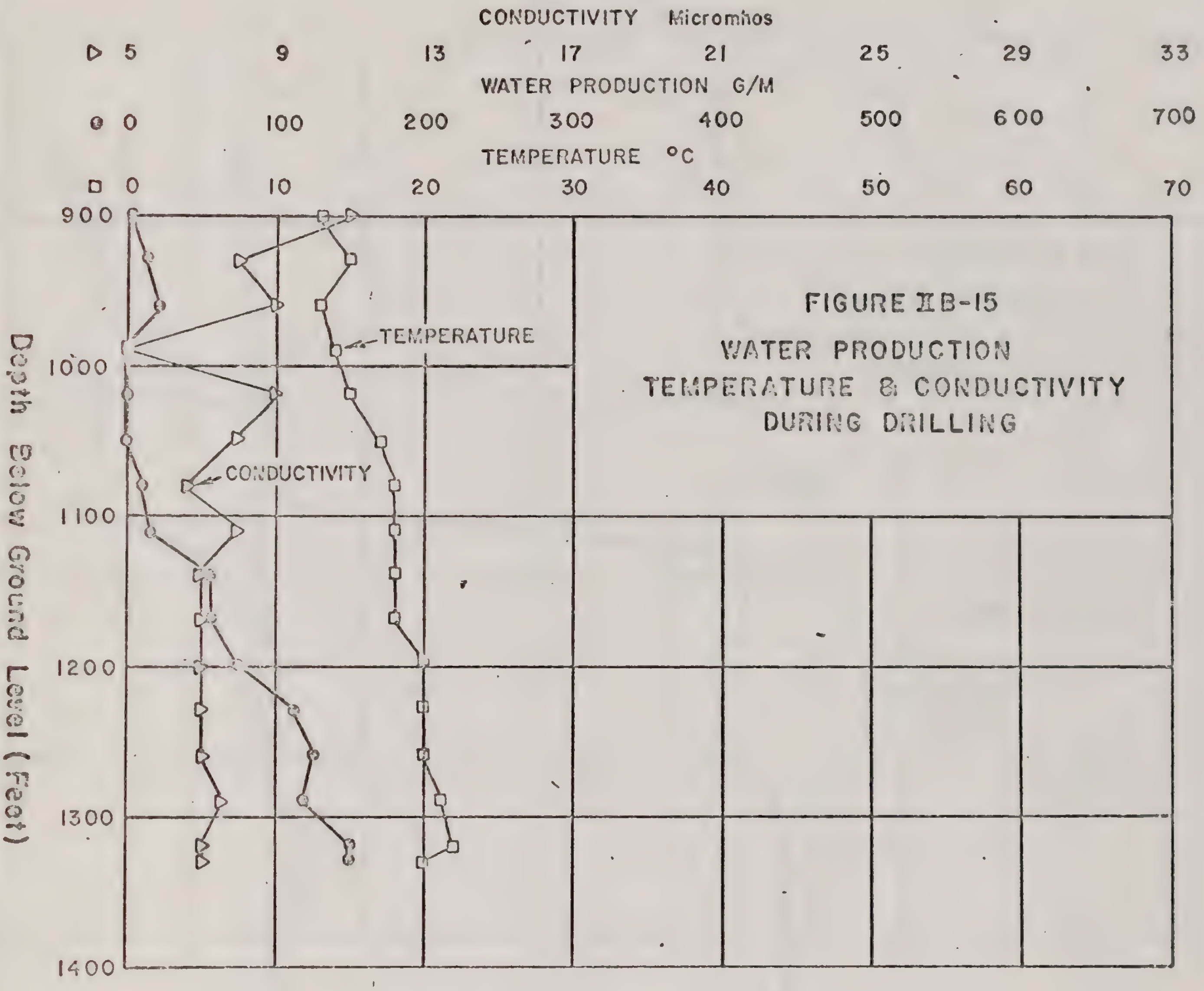


FIGURE IIB-15
WATER PRODUCTION
TEMPERATURE & CONDUCTIVITY
DURING DRILLING

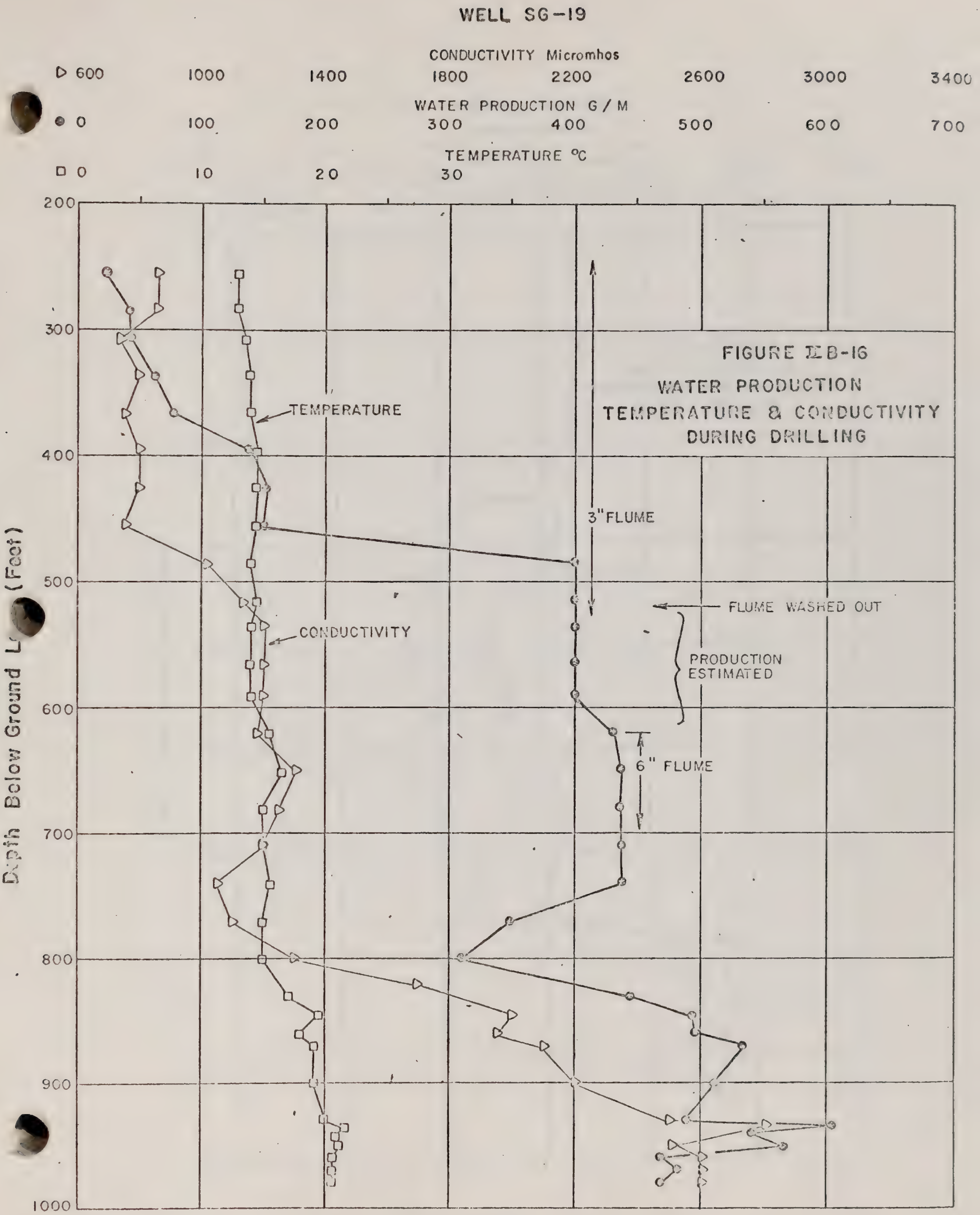
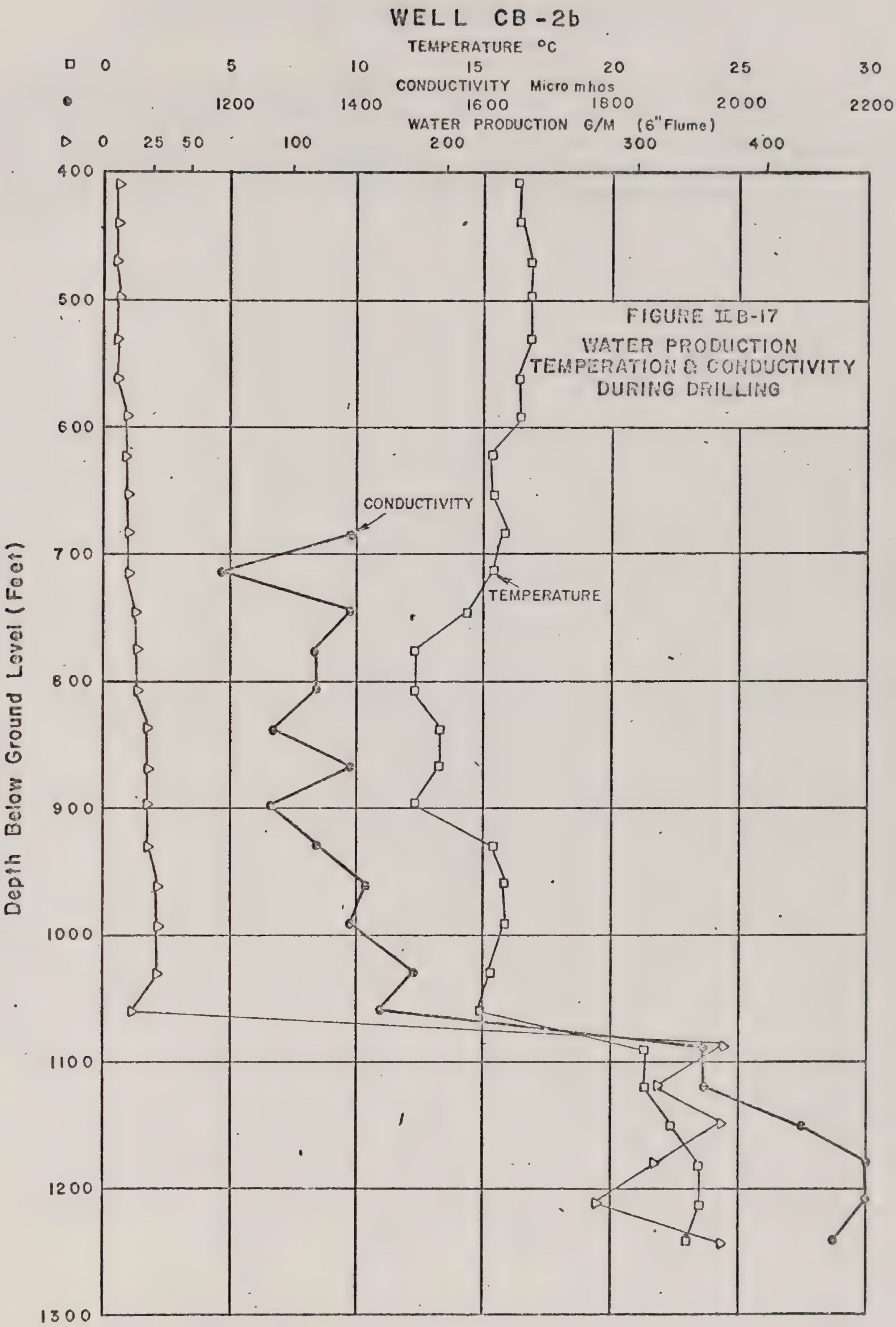


FIGURE II B-16

WATER PRODUCTION TEMPERATURE & CONDUCTIVITY DURING DRILLING



WELL CB-2b

FIGURE II B-17

WATER PRODUCTION TEMPERATION & CONDUCTIVITY DURING DRILLING

Water Production and Conductivity Data Sheets

Measurements of quantity, specific conductivity, and temperature of discharged water were made and recorded at drill hole intervals not exceeding 30 feet during drilling operations for each well drilled by November 30, 1974. The following data sheets are copies of the field records and serve as the basis for the preceding Figs. II B-3 through II B-17.

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch Aquifer #1 LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure ~~REMARKS~~
6-28	—	450 to 645	Air	MIST,	COULD NOT	ESTIMATE	WATER	PRODUCTION	
6-28	1740	645	14°C	1600	20 gal/min	6"		175	150 lb.
6-29	835	675	15°	1550	20	6"		200	150
6-29	953	705	16°	1300	20	6"		200	125
6-29	1145	735	20°	1350	200	6"	.18		175
6-29	1237	765	20°	1250	200	6"	.20	71.8	200
6-29	1319	795	20°	1200	200	6"	.22	85.3	175
6-29	1415	825	20°	1200	175	6"	.12	31.4	180
6-29	1510	855	20°	1150	180	6"	.195	68	195
6-29	1610	885	19.5°	1150	180	6"	.20	71.8	200
6-29	1744	915	20°	1200	180	6"	.205	72.	200
6-30	1049	945	19°	1250	200	6"	.24	98.7	250
6-30	1205	952	19°	1200	200	6"	.12	31.4	250
7-1	1038	982	17°	1150	200	6"	.27	116.7	250
7-1	1315	1012	19°	1150	300	6"	.20	71.8	250
7-1	1736	1042	19°	1100	200	6"	.20	71.8	300
7-2	1700	1072	20	1200	200	6"	.24	98.7	350
7-2	930	1102	19.5°	1000	200	6"	.28	125.7	300
7-3	1119	1132	20°	1500	200	6"	.29	130.2	350
7-3	1310	1162	20°	900	200	6"	.18	62.8	500

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch Aquifer #1 LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	AIR PRESSURE ~~REMARKS~~
7-3	15:35	1192	20°C	910	200 gal./min.	6"	.37	188.5	450 lb.
7-3	17:10	1222	20°	925	200	6"	.28	125.7	600
7-4	09:25	1252	21.5°	1000	200	6"	.45	251.3	475
7-4	12:10	1282	23.°	1000	200	6"	.29	130.7	400
7-4	15:43	1305	23.°	1050	200	6"	.30	139.1	400
7-4	17:11	1328	23.°	1050	200	6"	.30	139.1	400
7-4	18:21	1338	22.5°	1050	200	6"	.40	215.4	425

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET #1

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch Aquifer 1-A LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure + REMARKS
6-15		320				6"		4 gpm.	mud
6-15	9.00	349	16°C	700	2 g.p.m.	6"		6	
6-15	11:25	379	16.5	1400	2	6"		5	
6-16	12:35	404	14	1400	3.5	6"		10	
6-16	1:47	434	14	1400	3.5	6"		4	
6-16	2:35	464	15	1390	3.5	6"		20	
6-16	4 56	494	15	1400	3.5	6"		20	
6-16	6:22	524	15	1410	3	6"		15	
6-16	7:39	554	14	1600	2	6"		15	
6-16	8:32	584	16	1425	2	6"		15	
6-16	9:20	604	16	1200	2	6"		25	
6-16	10:45	634	16	1300	3	6"		30	110 lbs.
6-16	2:27	664	15.5	1150	2.5	6"		35	100
6-16	3:20	689	15.5	1100	2.5	6"		50	100
6-16	4:50	719	15.5	1100	2.5	6"		60	92
6-16	6:00	749	17	1100	2.5	6"		50	120
6-16	7:00	779	16	1000	2.5	6"		50	120
6-16	7:40	805	17	900	2.5	6"		50	120
6-16	8:10	820	17	950	2.5	6"	.13	36	120
[illegible]	[illegible]	[illegible]	[illegible]	950	2.5	6"	.18	63	120

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET #2

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch Aquifer 1-A LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure & REMARKS
6-16	2335	880	17°C	900	2.5 g.p.m.	6"	.16	49	150 lbs
6-17	0218	910	16	950	2.5	6"	.16	49	140
6-17	0435	940	16	900	2.5	6"	.17	54	160
6-17	1650	970	17	1100	3.0	6"	—	50	145
6-17	2007	1000	17	800	2.5	6"	.20	72	160
6-17	2225	1030	15	960	3.0	6"	.18	63	192
6-17	2347	1060	15	850	3.0	6"	.19	67	185
6-18	0212	1090	14	910	3.0	6"	.19	67	180
6-18	0515	1120	16	820	3.0	6"	.27	117	215
6-18	0648	1150	15	860	3.0	6"	.25	103	200
6-18	1440	1180	19	750	3.0	6"	—	50	200
6-18	1550	1210	19.5	800	3.0	6"	.22	85	240
6-18	1822	1240	21	850	3.5	6"	.08	—	245
6-19	2045	1270	22	920	5	6"	.36	184	260
6-19	2316	1274	22	1000	5	6"	.34	171	300
6-20	2200	1296	20	1000	5	6"	.38	202	310
6-21	0605	1304	20	920	5	6"	.38	202	320
6-22	0117	1325	21	1000	5	6"	.36	184	325
6-22	0900	1329	20.5	1020	5	6"	.35	175	325
6-22	1045	1344	23	1010	5	6"	.29	130	—

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET #3

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch Aquifer 1-A LOCATION

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - gpm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure + REMARKS
6-23	2300	1360	21°C	1010	5 g.p.m.	6"	.41	224	300 lbs.
6-24	0800	1390	22	1005	5	6"	.37	189	310
6-25	0102	1420	22	1000	5	6"	.36	189	340
6-25	2030	1450	22	1015	5	6"	.37	189	345
6-25	1310	1480	23	1020	5	6"	.43	242	340
6-27	1338	1484	22	1200	5	6"	.42	233	340
6-27	2340	1491	21	1015	5	6"	.43	242	340
6-28	0540	1504	20	1020	5	6"	.41	224	340
6-28	0800	1509	22	1200	5	6"	.20	72	450
6-28	0308	1518	23	1200	5	6"	.30	130	470
7-1	1223	1540	23	1250	5	6"	.42	233	415
7-1	1414	1570	23	1200	5	6"	.42	233	440
7-1	1625	1600	23.5	1200	5	6"	.42	233	400
7-1	1652	1611	23.5	1250	5	6"	.35	175	425

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SG-At- 1-A-1 LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	air Pressure
7/8	1000	480	17.°c			6"			
7/8	1115	510	17.°c			"			
7/8	0655	540	17.°c	1000	5gpm	"			
7/8	0740	570	17.°c	1200	.5gpm	"			
7/8	2015	600	15°c	1000	2.5 gpm	"			
7/8	2040	630	15.5°c	1150	2.5 gpm	"			
7/8	2145	660	15.5°c	1200	2.5gpm	"			
7/8	2255	690	16°c	1200	5gpm	"	.20	71.8	
7/9	0005	720	16°c	1200	5gpm	"	.19	67.3	
7/9	0120	750	16.5°c	1200	5gpm	"	.20	71.8	
7/9	0228	780	17°c	1200	5gpm	"	.20	71.8	
7/9	0315	810	17°c	1200	5gpm	"	.23	89.8	
7/9	0425	840	17°c	1200	5gpm	"	.23	89.8	
7/9	0530	870	18°c	1200	5gpm	"	.24	98.7	
7/9	0717	900	18°c	1200	5gpm	"	.25	103.2	
7/9	0905	930	19°c	1200	5gpm	"	.27	116.7	
7/9	1100	960	20.°c	1200	5gpm	"	.26	112.7	
7/9	1320	990	20.°c	1300	4gpm	"	.27	116.7	250 lbs.
7/9	1730	1020	20°c	1150	4.5 gpm	"	.29	130.2	280 lb.
7/9	1845	1050	20°c	1150	4.5 gpm	"	.29	130.2	280 lb.

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER S.G. AT-1-A-1 LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (roto - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	air Pressure
7/9	2039	1080	20°C	1250	5gpm	6"	.30	134.1	190 lbs
7/9	2200	1110	19°C	1150	5gpm	"	.31	138.6	200 lbs
7/9	2327	1140	19°C	1100	5gpm	"	.30	134.1	190 lbs
7/10	0101	1170	19°C	1100	5gpm	"	.28	120.7	200 lbs
7/10	0245	1200	19°C	1000	5gpm	"	.31	138.6	200 lbs
7/10	0437	1230	21°C	1000	5gpm	"	.35	170	255 lbs
7/10	0637	1260	21°C	1000	5gpm	"	.33	150.6	280 lbs
7/10	1010	1290	22°C	1100	5gpm	"	.45	255.3	400 lbs
7/10	1200	1320	22°C	1150	5gpm	"	.43	237.4	400 lbs

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER S.G.-AT-1B LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - gpm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	REMARKS
7/16	1504	451	13.0 °C	1250	15 gpm	6"		18 gpm ±	50 lbs
7/16	1544	480	17.0 °C	1200	15 gpm	"		20 gpm ±	50 lbs
7/16	1618	510	17.5 °C	1200	15 gpm	"		22 gpm ±	50 lbs
7/16	1654	540	17.5 °C	1000	15 gpm	"		25 gpm ±	75 lbs
7/16	1744	570	13.0 °C	1200	15 gpm	"		25 gpm ±	100 lbs
7/16	1814	600	17.5 °C	1200	15 gpm	"		28 gpm ±	100 lbs
7/16	1852	630	16.0 °C	1000	20 gpm	"		30 gpm ±	100 lbs
7/16	1922	660	16.5 °C	1200	20 gpm	"		30 gpm ±	100 lbs
7/16	2029	690	16.5 °C	1200	20 gpm	"		30 gpm ±	100 lbs
7/16	2134	720	15.5 °C	1000	22 gpm	"		30 gpm ±	100 lbs
7/16	2244	750	15.5 °C	1100	22 gpm	"		30 gpm ±	100 lbs
7/16	2332	780	15.5 °C	1000	22 gpm	"		30 gpm ±	100 lbs
7/17	0025	810	16.0 °C	1000	22 gpm	"		30 gpm ±	100 lbs
7/17	0128	840	15.5 °C	1050	22 gpm	"		30 gpm ±	100 lbs
7/17	0231	870	15.5 °C	1000	22 gpm	"		30 gpm ±	100 lbs
7/17	0411	900	15.5 °C	1100	22 gpm	"	.15	–Injected H₂O 45 gpm	100 lbs
7/17	0705	930	16.0 °C	1000	22 gpm	"	.16	50 gpm	100 lbs
7/17	0853	960	16.5 °C	1000	22 gpm	"	.18	59 gpm	100 lbs
7/17	1554	990	17.5 °C	1150	22 gpm	"	.18	59 gpm	50 lbs
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	"	.10	[illegible]	50 lbs

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch Aquifer Test 1-B LOCATION ______

(Free pumping water out of pit)

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	(minus injected water)	Air Pressure + REMARKS
7-17	1911	1050	17.5°C	1050	22 g.p.m	6"	.19	85	63	75 lbs.
7-17	2119	1080	18.0°C	950	22	6"	.27	120	98	100
7-17	2230	1110	18.5°C	900	22	6"	.29	130	108	110
7-17	2335	1140	19.0°C	1100	22	6"	.27	120	98	110
7-18	0055	1170	19.0°C	1000	22	6"	.32	144	122	110
7-18	0310	1200	19.5°C	1000	22	6"	.27	120	98	140
7-18	0451	1230	21.0°C	1100	22	6"	.43	200	178	150
7-18	0610	1260	21.0°C	1100	22	6"	.36	162	140	150
7-18	0806	1290	21.5°C	1000	22	6"	.46	206	184	160
7-18	0909	1320	22.0°C	1050	22	6"	.49	219	197	150
7-18	1059	1340	22.5°C	1075	22	6"	.58	260	238	150
7-18	1539	1350	22.0°C	1100	22	6"	.45	202	180	175
7-18	1716	1380	22.0°C	1100	22	6"	.43	200	178	190 ([illegible])
7-18	1904	1410	22.0°C	1100	22	6"	.45	202	180	160
7-18	2031	1424	22.0°C	1100	22	6"	.48	215	193	180
7-19	1157	1430	22.0°C	1150	22	6"	.54	242	202	200
7-19	1347	1460	22.0°C	1100	22	6"	.50	224	202	200
7-19	1515	1490	22.0°C	1150	22	6"	.49	219	197	200 ([illegible])
7-[illegible]	[illegible]211	1520	22.0°C	1150	22	6"	.52	233	211	220
7-19	[illegible]25	1550	22.0°C	1150	22	6"	.52	233	211	[illegible]

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch Aquifer 1-B LOCATION

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus injected water	Air Pressure + REMARKS
7-19	2056	1580	22.0°C	1100	22 g.p.m.	6"	.71	205	183	180 lbs.
7-19	2224	1610	22.5°C	1100	22	6"	.75	214	194	150
7-19	2250	1620	22.5°C	1100	22	6"	.71	205	183	160
7-20	2010	1630	22.5°C	1200	22	6"	.71	205	183	160

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET #1

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch A.T. #1-C LOCATION

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)		Air Pressure + REMARKS
8-12	0605	420	13.0°C	1100	8-10 gpm.	6"	—			90 lbs.
8-12	0812	450	15.0°C	1150	8	6"	—	15 g.p.m.±		90
8-12	1054	480	18.5	1450	5	6"	—	15 Est.		70
8-12	1204	510	16.5	1450	5	6"	—	20 "		80
8-12	1346	540	16.5	1425	5	6"	—	20 "		90
8-12	1420	570	15.5	1350	5	6"	—	25 "		90
8-12	1525	600	15.5	1300	5	6"	—	30 "		100
8-12	1648	630	16.5	1250	5	6"	—	35 "		110
8-12	1749	660	16.0	1275	5	6"	—	45 "		130
8-12	1917	690	16.0	1250	5	6"	.18	GROSS 63	NET 58	130
8-12	2002	720	15.0	1200	5	6"	.25	103	98	130
8-13	0022	750	15.0	1200	5	6"	.25	103	98	110
8-13	0157	780	15.0	1200	5	6"	.23	90	85	110
8-13	0345	810	15.0	1175	5	6"	.19	67	62	150
8-13	0540	840	15.0	1150	5	6"	.26	112	107	130
8-13	0735	870	16.0	1050	5	6"	.23	90	85	130
8-13	1135	890	16.0	1050	5	6"	.24	99	94	130
8-13	2120	920	16.0	1150	5	6"	.28	125	120	150
8-14	0055	950	16.5	1200	5	6"	.28	125	120	220
8-14	0430	980	16.0	1100	5	6"	.26	112	107	220

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET#2

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch A.T. #1-C LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus injected water	Air Pressure + REMARKS
8-14	1002	1010	16.5 °C	1100	8 g.p.m.	6"	,30	139	131	240 lbs.
8-14	1155	1040	17.0	1150	8	6"	.28	126	118	240 lbs.
8-14	1444	1070	17.5	1150	8	6"	.30	139	131	240
8-14	1654	1100	18.5	1175	8	6"	.34	171	163	240
8-14	1952	1130	18.5	1150	8	6"	.32	152	145	240
8-14	2240	1160	19.0	1100	8	6"	.31	144	136	250
8-15	0315	1190	18.0	1100	8	6"	.32	153	145	240
8-15	0625	1220	20.0	1100	8	6"	.39	210	202	260
8-15	0928	1250	20.5	1150	8	6"	.35	175	163	260
8-15	1232	1280	20.5	1100	8	6"	.37	188	180	240
8-15	1437	1310	21.0	1175	8	6"	.45	260	252	240
8-15	1635	1340	21.5	1200	8	6"	.52 ?			250)
8-16	0707	1370	21.0	1200	8	6"	.57 ?			270 (silt in [illegible]
8-16	0905	1400	22.0	1250	8	6"	.62 ?			270 (
8-16	1042	1430	22.0	1250	8	6"	.63 ?	462	454	260)
8-16	2053	1460	22.0	1250	8	6"	.49	300	292	220
8-16	2227	1490	22.5	1250	8	6"	.44	251	243	260
8-17	0145	1512	22.5	1250	8	6"	.40	215	207	260
8-17	2028	1540	22.0	1250	8	6"	.53	341	333	260
8-17	2145	1570	22.0	1200	8	6"	.52	327	319	270

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET #3

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch A.T. #1-C LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus injected water	Air Pressure + REMARKS
8-17	2335	1600	22.0°C	1200	8 gpm	6"	,51	318	310	270 lbs
8-18	0046	1630	22.0	1200	8	6"	.50	301	297	270
8-18	0132	1640	22.0	1200	8	6"	.50	301	297	270

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SG-AT-1D LOCATION

DATE	TIME	DEPTH'	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - gpm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	air Pressure
7/22	330	480	14.0°C	1500	12 gpm	6"		20 gpm ±	220 lbs
7/22	430	510	14.0°C	1550	12 gpm	"		20 gpm ±	280 lbs
7/22	530	540	14.0°C	1500	12 gpm	"		25 gpm ±	250 lbs
7/22	600	570	14.5°C	1550	12 gpm	"		20 gpm ±	290 lbs
7/22	2115	600	13.0°C	1600	5 gpm	"		25 gpm ±	310 lbs
7/22	2122	630	13.0°C	1300	5 gpm	"	.15	− Injected H$_2$O 40 gpm	310 lbs
7/22	2245	660	13.0°C	1000	5 gpm	"	.15	40 gpm	300 lbs
7/22	2332	690	14.0°C	1200	5 gpm	"	.21	76 gpm	350 lbs
7/22	2400	720	14.0°C	1150	5 gpm	"	.22	80 gpm	370 lbs
7/23	0050	750	14.5°C	1150	5 gpm	"	.24	94 gpm	370 lbs
7/23	0125	780	14.5°C	1050	5 gpm	"	.25	93 gpm	350 lbs
7/23	0215	810	14.5°C	1100	8 gpm	"	.23	81 gpm	370 lbs
7/23	0250	840	14.5°C	1000	8 gpm	"	.25	95 gpm	380 lbs
7/23	0408	870	14.5°C	1050	8 gpm	"	.24	91 gpm	350 lbs
7/23	0450	900	15.0°C	1100	8 gpm	"	.26	104 gpm	390 lbs
7/23	0905	930	15.0°C	1100	8 gpm	"	.27	109 gpm	360 lbs
7/23	1107	960	15.0°C	1100	8 gpm	"	.26	104 gpm	360 lbs
7/24	1140	990	16.0°C	1350	8 gpm	"	.26	104 gpm	200 lbs
7/24	1335	1020	16.0°C	1200	8 gpm	"	.15	37 gpm	170 lbs
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	"	[illegible]	[illegible]	190 lbs

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET #2

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch Aquifer 1-D LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE flume (gpm)	minus injected water	Air Pressure + REMARKS
7-24	1725	1080	17.0°C	1050	8 g.p.m.	6"	.27	117	109	190 lbs.
7-24	1910	1110	17.5°C	1000	8	6"	.31	144	136	200
7-24	2155	1140	18.0°C	1000	8	6"	.34	171	163	200
7-25	0124	1170	18.0°C	900	6	6"	.34	171	163	210
7-25	0339	1200	18.5°C	900	8	6"	.37	189	181	220
7-25	0605	1230	19.0°C	950	8	6"	.38	202	194	250
7-25	0818	1260	19.5°C	950	8	6"	.38	202	194	240
7-25	1315	1290	20.5°C	1000	8	6"	.38	202	194	230
7-25	1430	1310	21.0°C	1050	8	6"	.40	215	207	210
7-25	1615	1340	22.0°C	1200	8	6"	.28	126	118	250
7-26	0816	1370	21.5°C	1100	8	6"	.45	260	252	270
7-26	1127	1400	22.5°C	1200	8	6"	.45	260	252	270
7-26	1421	1430	21.5°C	1200	8	6"	.45	260	252	260
7-26	1708	1450	21.0°C	1200	8	6"	.50	308	300	280
7-27	0555	1470	21.0°C	1200	12	6"	.55	359	351	300
7-27	0728	1500	21.0°C	1200	12	6"	.55	359	351	300
7-27	1300	1530	21.5°C	1200	12	6"	.52	328	316	300
7-27	1525	1560	22.5°C	1200	12	6"	.48	292	280	300
7-27	1701	1590	23.0°C	1200	12	6"	.47	283	271	310
7-27	1927	1620	23.0°C	1250	12	6"	.48	292	280	300

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET #3

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch Aquifer 1-D LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE flume (gpm)	minus injected water	Air Pressure & REMARKS
7-27	2100	1640	22.5°C	1200	12 g.p.m.	6"	.48	292	280	310
7-27	2200	1640	22.0°C	1200	12	6"	.40	215	207	320

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch #6 LOCATION

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	AiR Pressure
7-31-74	1826	417	15.5°C	1000 ?	12 gal./min.	6"		15 Est	100 lb.
7-31	1907	440	16.5	1050?	12	6"		16 "	90
7-31	2000	470	14.5	1050?	18	6"		25 "	100
7-31	2157	500	14.5	1250?	18	6"		28 "	90
7-31	2314	530	14.5	1200	18	6"		28 "	90
8-1	0201	560	13.5	1300	18	6		30 "	90
8-1	0331	590	13.5	1200	18	6		30 "	110
8-1	0550	620	13.0	1200	18	6		35 "	100
8-1	0730	650	13.0	1200	18	6		35 "	100
8-1	1021	680	15.0	1400	18	6		35 "	100
8-1	1055	710	15.0	1250	18	6		35 "	100
8-1	11:54	740	16.5	1300	18	6		40 "	100
8-1	1228	770	16.0	1300	18	6		40 "	125
8-1	1305	800	16.0	1100	18	6		40 "	100
8-1	1422	830	16.5	1200	18	6		45 "	125
8-1	1506	855	16.5	1200	18	6		45 "	125
8-1	1542	880	17.0	1000	18	6		45 "	125
8-1	1656	910	17.0	1000	18	6		50 "	125
8-2	0349	940	16.0	950	18	6	.18	41	200
8-2	[illegible]	970	15.5	900	18	6	.11	9	200

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch #6 LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus INJECTED WATER	AIR PRESSURE
8-2	0805	1000	16.	1160	18 gal./min.	6"	.24	99	81	200 lb.
8-2	1020	1030	16.5	1000	18	6	.11	27	9	200
8-2	1220	1060	17.	950	22	6	.11	27	5	135
8-2	1530	1090	19.	900	22	6	.16	49	27	125
8-2	1745	1120	20.	925	22	6	.25	103	81	150
8-2	2053	1150	19.	1200	22	6	.21	81	69	150
8-2	2300	1165	19.	1000	22	6	.23	90	68	150
8-2	0144	1180	19.	900	22	6	.19	62	45	180
8-3	0331	1200	19.	900	22	6	.25	103	81	160
8-4	0215	1217	19.5	1200	22	6	.32	153	131	290
8-4	0445	1230	19.5	1100	22	6	.36	184	162	360
8-4	1735	1260	21.5	1150	22	6	.39	211	189	320
8-5	0544	1290	21.5	1200	22	6	.40	215	193	350
8-6	2143	1320	21.	1450	22	6	.35	175	153	370
8-9	0436	1350	21.	1300	22	6	.47	283	261	370
8-9	1650	1380	21.	1300	22	6	.45	260	238	370
8-10	0725	1410	21.	1235	22	6	.46	274	252	370
8-10	1840	1440	22.	1300	22	6	.48	292	270	370
8-11	1040	1470	23.	1350	22	6	.48	292	270	380
8-11	2125	1500	22.5	1300	22	6	.47	283	261	380

Pag. 2 of 4.

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH #6 LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus injected water	AIR PRESSURE
8-12	420	1530	22.0°	1350	22 gal./min.	6"	.42	233	211	380 lb.
8-12	2116	1560	23.5	1300	22	6	.48	292	270	380
8-13	1615	1590	23.5	1300	22	6	.47	283	261	380
8-13	2021	1620	23.5	1300	22	6	.47	283	261	390
8-14	0658	1650	23.5	1300	22	6	.45	260	248	400
8-14	1935	1680	24	1300	22	6	.48	292	270	385
8-15	1310	1710	24	1050	22	6	.50	310	288	325
8-16	0135	1740	24	1300	22	6	.42	233	211	350
8-16	0805	1770	22.5	1400	22	6	.30	139	117	325
8-16	1601	1800	25.	1350	22	6	.48	292	270	390
8-16	2130	1830	24.5	1300	22	6	.47	283	261	400
8-17	0630	1860	23.5	1300	22	6	.48	292	270	400
8-17	0738	1890	23.5	1450	22	6	.46	279	252	410
8-18	1215	1917	24.5	1400	22	6	.47	283	261	405
8-18	0530	1920	23.5	1350	22	6	.44	251	239	400
8-18	1246	1950	25.	1450	22	6	.47	283	261	390
8-18	2028	1980	25.	1500	22	6	.37	283	261	400
8-19	0420	2010	25.	1500	22	6	.46	274	252	410
8-19	1452	2090	24.5	1550	22	6	.49	301	277	380
8-19	2350	2070	25	1400	22	6	.49	301	277	600

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch #6 LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus injected water	AIR PRESSURE REMARKS
8-20	1252	2100	25.0°C	1600	22 gal./min.	6"	.55	359	337	500
8-20	1910	2130	25.0	1500	22	6	.55	359	337	500
8-20	0224	2160	25.0	1500	22	6	.53	341	319	486
8-21	1517	2190	25.0	1500	22	6	.54	350	328	500
8-21	2214	2220	25.0	1550	22	6	.49	301	277	490

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH #9 LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm) NET	AIR PRESSURE REMARKS
9-29	1315	340	13.5	750	10	6"	TRACE	0-5	100
9-30	0255	620	15	1300	10	6	"	"	100
9-30	0335	650	15.5	1350	10	6	"	"	100
9-30	0450	680	16.	1400	10	6	"	"	100
9-30	0540	710	16.5	1200	10	6	"	"	100
9-30	0655	740	13.	1300	10	6	.14	30	200
9-30	0805	770	13.	1250	10	6	.17	44	200
9-30	0830	800	12.5	1250	10	6	.19	57	200
9-30	1007	830	16.	1050	10	6	.19	57	175
9-30	1200	860	16.5	1000	10	6	.19	57	175
9-30	2337	890	15.5	950	10	6	.23	80	175
10-1	138	920	15.	850	10	6	.22	75	175
10-1	255	950	15.5	850	10	6	.22	75	175
10-1	358	980	15.	800	10	6	.22	75	175
10-1	1135	1010	17.	900	10	6	.25	93	200
10-1	1320	1040	17.	900	10	6	.49	290 ?	200
10-1	1440	1060	18.	900	10	6	.29	120	200
10-1	1630	1090	17.5	900	10	6	.29	120	200
10-2	300	1120	17.	900	10	6	.28	116	200
10-2	1150	1155	18.	1000	10	6	[illegible]	165	[illegible]

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH #9 LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	AIR PRESSURE REMARKS
10-2	1410	1175	18.5	1000	10	6"	.36	174	200
10-2	2120	1200	19.	1200	10	6	.43	232	200
10-3	22:33	1230	20.	1000	10	6	.44	242	325
10-3	16:05	1260	20.	1106	10	6	.47	274	425
10-5	1905	1290	20	1150	10	6	.47	274	425
10-5	1510	1320	19.5	1100	10	6	.50	299	425
10-5	450	1350	20.	1150	10	6	.49	291	425
10-6	1610	1370	20.5	1200	10	6	.55	348	400
10-6	1215	1400	21.5	1250	10	6	.76	601.4	400
10-7	2115	1430	21.	1106	10	6	.78	625	425
10-8	703	1460	22.	1200	10	6	.59	400	475
10-8	1500	1490	22	1400	10	6	.55	348	400
10-9	410	1520	22	1300	10	6	.55	348	400
10-9	2130	1550	22.5	1300	10	6	.61	422	425
10-10	0305	1580	22.	1300	10	6	.61	422	600
10-11	2159	1610	23.	1400	10	6	.58	390	625
10-12	0530	1640	21	1300	10	6	.60	413	600
10-12	1637	1670	22	1400	10	6	.60	413	450
10-12	2305	1700	22	1400	10	6	.60	413	400
					10	6	.61	422	400

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SG-9 LOCATION ______

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - gim)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	REMARKS
10-13	1450	1760	23. °C	1400	10 gpm	6"	.62	434 gpm	400 lbs
10-14	0245	1790	23	1450	10	6	.62	434	400
10-14	0920	1820	22	1600	10	6	.60	413	450
10-14	1855	1850	22.5	1600	10	6	.63	444	450
10-15	0230	1880	22.	1700	10	6	.58	390	410
10-15	0935	1910	22.5	1800	10	6	.58	390	480
10-15	1605	1940	23	1600	10	6	.63	444	425
10/16	309	1970	22.5	1200	10	6	.60	413	410
10/16	525	2000	23.0	1200	10	6	.62	434	410
10/16	1250	2030	23.5	1400	10	6	.62	434	425
10/16	1510	2060	24.	1400	10	6	.62	434	460
10/16	2040	2090	23.5	1400	10	6	.62	434	460
10/16	2253	2120	23.5	1300	10	6	.60	413	450
10/17	757	2150	23.5	1600	10	6	.61	422	410
10/17	1019	2180	24.	1750	10	6	.60	413	425
10/17	1830	2210	24.	2000	10	6	.62	434	440
10/17	2044	2240	24.	1600	10	6	.62	434	450
10/18	347	2270	24.	1700	10	6	.63	444	475
10/18	1041	2300	24.	1700	10	6	.62	434	450
10/1	[illegible]	2330	23.5	1700	15	6	.61	422	625

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR Arco WELL NAME & NUMBER [illegible] # 9 LOCATION 11-T[illegible]-R[illegible]W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	REMARKS
10-18	20:43	2360	23.5	1650	10	6	.61	422	600
10-19	6:25	2390	23.5	1600	10	6	.62	434	475
10-19	16:25	2420	23.	1550	15	6	.50 ?	299 ?	675
10-19	19:07	2450	24.	1700	15	6	.61	422	625
10-20	9:00	2480	23.5	1650	15	6	.57	381	650
10-20	11:40	2510	24.	1650	15	6	.60	413	700
10-20	21:16	2540	23.5	1500	15	6	.58	390	750
10-20	23:40	2570	23.5	1500	15	6	.61	422	750
10-21	12:30	2600	22.5	1750	15	6	.53	341	650
10-21	16:30	2630	23	1650	15	6	.54	350	625
10-22	8:50	3660	23.5	1500	15	6	.60	413	775
10-22	21:25	2690	23.5	1800	15	6	.54	399	800
10-23	1307	2720	23.5	1600	15	6	.48 ?	292	700
10-23	16:05	2750	23.5	1800	15	6	.57	381	600

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR Arco WELL NAME & NUMBER Sorghum Gulch #10 LOCATION: 13-3S-97W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	REMARKS
6-10-74	1:35	445'	11° C	1000	5 gal./min.	3"		10 ± 5 gal./min.	Rust hue
6-10	2:01	460'	12° C	1300	5	3		10 ± 5 gal./min.	Rust hue
6-10	3:00	490'	12°	1400	6.9	3		14 ± 7 g/m	Brown hue
6-10	5:44	520'	11.5°	1400	6.9	3		14 ? ± g/m	increasing
6-10	6:20	550'	11.5°	1400	3.6	3		14 ? ± 10 g/m	attached tank
6-10	6:58	580'	12.5°	1400	3.6	3		20 ± 16 g/m	Pool filling rapidly
6-10	7:59	610'	12.5°	1500	2.4	3		20 ± 18	Gray hue
6-10	9:00	640	12.5°	1400	4.0	3		30 est.	
6-10	10:00	670	16.°	1300	4.5	3		40 est.	
6-10	11:45	700	16.°	1300	4.6	3		50 est	
DUSTED TO 403' started to add mist @ 404'.									
Hit water at 430'. Sand damp from 370' on down.									
6-10	1325	730	16.5	1250	4.6 gal./min	3		50 g/m est.	
6-10	1430	760	16.	1210	4.6	3	.08	4 g/m	Losing wtr. to pit
6-10	1550	790	16.	1000	4.6	3	.18	26.8	
6-10	1655	820	16.5	1250	4.6	3	.16	21.4	
6-10	1738	840	16.5	800	4.6	3	.20	32.2	
6-10	1925	870	17.	700	4.6	3	.19	29.5	
6-10	2045	900	18.	1100	6.9	3	.22	35.8	
6-10	2200	930	16.5	930	6.9	3	.23	38.9	

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch #10 LOCATION 13-3S-97W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus injected water	REMARKS
6-10	4:55	960	17° C	910	6.9 gal./min.	3"	.21	39.9	33.0	
6-11	14:00	990	17.5°	990	6.9	3	.14	21.1	14.2	
6-11	15:35	1020	18°	890	6.9	3	.25	52.5	45.6	
6-11	17:05	1050	18°	850	6.9	3	.27	58.8	51.9	
6-11	19:45	1080	19°	720	6.9	3	.29	65.5	58.6	
6-11	2140	1110	18	670	6.9	3	.36	92.0	85.1	
6-12	0015	1140	19	620	6.9	3	.42	116.7	109.8	
6-12	0220	1170	19	610	6.9	3	.41	112.2	105.3	
6-12	0430	1200	19	680	6.9	3	.44	125.2	118.3	
6-13	0225	1230	20	750	13.8	3	.42	116.7	102.9	
6-13	1432	1260	24	800	9.2	3	.45	129.7	120.5	
6-13	1830	1280	22	800	9.2	3	.23	45.8	35.	Losing Circulation
6-14	0350	1310	22	800	9.2	3	.58	191.6	182.4	
6-15	0315	1340	22	850	9.2	3	.52	162.	152.8	
6-15	1220	1370	22.5	900	8.0	3	.41	112.2	104.2	
6-15	1635	1390	22.5	900	7.0	3	.55	176.4	171.4	
6-15	1720	1400	23.	900	7.0	3	.60	202.	195	
6-16	1500	1430	20.5	900	7.0	3	.55	176.4	169.4	
6-16	2255	1460	21.5	900	7.0	3	.54	171.4	164.4	
6-17	0755	1490	21.5	920	7.0	3	.54	171.4	164.4	

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR AECO WELL NAME & NUMBER Sorghum Gulch #10 LOCATION 13-35-97W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm) Net	air pressure REMARKS
6-17-74	1600	1520	23°C	900	7.0	3"	.59	189.6	
6-20	0835	1550	22	900	7	3	.60	195	
6-20	1345	1580	23	950	7	3	.57	189.6	400#
6-20	2315	1610	23	900	7	3	.62	205.7	
6-21	0840	1640	22	900	7	3	.62	205.7	400
6-21	2250	1650	22	900	7	3	.63	210.7	
6-22	0742	1680	22	980	7	3	.60	195	
6-22	1325	1705	21.5	980	7	3	.60	195	450
6-22	1845	1734	22	1000	7	3	.60	195	450
6-23	0638	1764	22	1000	7	3	.60	195	475
6-24	0206	1794	22	920	7	3	.64	216	425
6-24	1150	1824	23.8	980	10	3	.63	207.7	
6-25	0135	1854	23	950	10	3	.64	213	
6-25	2142	1884	23.5	1000	10	3	.60	192	
6-26	0910	1914	23.5	1200	10	3	.52	152	
6-26	1500	1944	24	1000	10	3	.59	186.6	
6-26	2231	1974	23	1090	10	3	.51	147.1	
6-27	0422	2004	23	1200	10	3	.62	202.7	
6-27	1155	2036	24.5	1200	9	3	.60	193	
6-27	1205	2040	24.5	800	9	3	.54	162.4	

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ABCO WELL NAME & NUMBER Sorghum Gulch #10 LOCATION 13-3S-97W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	minus injected water	REMARKS
6-27-7	1715	2070	24.5	1200	9 gal./min.	3"	.54	171.4	162.4	
6-28	0617	2100	24	1080	8	3	.64	223.	215	
6-28	1150	2130	24.5	1150	6	3	.59	196.6	190.6	
6-28	1935	2160	25.5	1100	8	3	.57	186.3	178.3	
6-29	0050	2190	23.	1226	8	3	.58	191.6	183.6	
6-29	0610	2211	24.5°	1250	8	3	.58	191.6	183.6	

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ACCO WELL NAME & NUMBER Sorghum Gulch #10A LOCATION 13-35-97W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure REMARKS
7-8-79									water @ 915'
7-8	9:35	470	17°C		4	3"	0	1.5 Est.	100±
7-8	10:50	520	17		4	3	0	15 "	100
7-8	11:35	550	17		4	3	0	15 "	100
7-8	12:15	560	17	1400	4	3	0	15 "	100
7-8	12:55	570	16	1200	4	3	0	15 "	125
7-8	1:30	620	17	1400	4	3	0	15 "	125
7-8	2:52	650	17	1350	4	3	.22	43	125
7-8	3:40	680	17.5	1375	4	3	.22	43	140
7-8	1745	710	17.5	1350	4	3	.22	43	140
7-8	1825	740	17	1300	4	3	.24	49	150
7-8	1900	760	17	1300	4	3	.24	49	150
7-8	1935	780	17.5	1300	4	3	.24	49	150
7-8	2026	810	16.5	1240	4	3	.23	46	150
7-8	2145	840	17	1200	4	3	.23	46	150
7-8	2334	870	16	1220	4	3	.24	49	150
7-9	1:07	900	16	1350	4	3	.24	49	150
7-9	5:16	930	16	1350	4	3	.24	49	150
7-9	7:17	960	17	1200	4	3	.24	49	150
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	4	3	.27	[illegible]	175

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR AGOO WELL NAME & NUMBER Sorghum Gulch #10A LOCATION ______________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	REMARKS
7-9	9:20	1020	19.5°C	1000	5	3"	.32	76	175
7-9	12:45	1050	19.0	1100	5	3	.32	76	175
7-9	1340	1050	19.5	1000	5	3	.31	74	175
7-9	1420	1100	20.5	900	5	3	.38	100	200
7-9	2025	1130	20.0	650	5	3	.38	100	250
7-9	2230	1160	19.5	1100	5	3	.38	100	300
7-10	:54	1190	19.5	1190	5	3	.39	104	300
7-10	5:30	1220	20.5	780	5	3	.46	134	325
7-10	6:52	1250	20.0	2018	5	3	.42	117	325
7-10	9:15	1250	21.0	—*	5	3	.36	92	350
7-10	10:25	1310	22.0	—*	5	3	.37	98	350
7-10	11:25	1333	22.0	—*	5	3	.52	176	350

* Conductivity Meter broke down.

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch # 11 LOCATION 7-3S-96W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	AiR Pressure
7-24-79		286.6						± 5	150
7-24		336.6						± 5	150
7-24		386.6						± 5	150
7-24		436.6						± 5	175
7-24		496.6	16°C	1600	5 gal./min. (PRIOR TO JETTING)			± 5	175
7-24		516	16	1550	8			± 5	175
7-24	1600	536.6	15	1700	8 (Prior to jetting)			± 5	175
7-24		566	16	1675	8				175
7-24	1825	586.6	15	1700	8 (Prior to jetting)			25 ± 5	175
7-24	1930	616	16	1600	2			30 ± 5	175
7-24	2040	636.6	16	1500	4 (Prior to jetting)				175
7-24	2240	666	15	1450	4				175
7-24	2352	686.6	15	1450	4 (Prior to jetting)			Minus injected water	175
7-25	0222	716.6	16.5	1200	4	3"	.32	72.3	175
7-25	0350	737.1	16	1180	4	3	.30	65.1	200
7-25		767	17	1050	4	3	.36	88.0	200
7-25	2146	786.5	16.5	1000	4	3	.36	88.0	
7-27		816.6	16.0	1190	5	3	.42	117	
7-27	0330	836.6	16.5	1025	5	3	.43	115.7	
7-27	0525	[illegible]	16.5	900	5	3	.42	111.7	240

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH # 11 LOCATION 7-3S-96W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	AIR Pressure
7-27	2300	885	17	1200	15 gal. min.	3"	.49	142.6	300
7-28	1545	915	17.5	875	5	3"	.42	116.7	250
7-28	1945	925	17.5	900	5	3	.4	108.2	275
7-29	0135	955	18	750	5	3	.41	112.2	275
7-29	0715	975	17.5	700	5	3	.29	65.5	300
7-29	1630	1005	18.5	950	6	3	.32	76.3	300
7-29	2620	1025	18	800	6	3	.56	181.3	360
7-30	0200	1055	18	700	6	3	.52	162.	375
7-30	—	1075	18.5	750	6	3	.58	191.	375
7-30	1800	1105	20	950	7	3	.48	143.2	375
7-30	2305	1125	19.5	780	7	3	.59	196.6	375
7-31	0502	1145	19.5	700	7	3	.68	191.6	375
7-31	0950	1156	19.5	700	7	3	.56	181.3	375
7-31	1545	1168	19.5	800	7	3	.52	162.	375
7-31	1845	1175	19.5	875	7	3	.61	207.	400
7-31	2005	1185	20.5	880	7	3	.63	218.	400
8-1	0110	1198	20	890	7	3	.59	197.	400
8-1	0543	1214	20.	816	7	3	.62	212.	400
8-1	1650	1244	21.5	1000	7	3	.56	181.	400
[illegible]	[illegible]	[illegible]	21	1000	7	3	.53	116.5	400

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

*used to aerate water

OPERATOR ARCO WELL NAME & NUMBER SG # 11 LOCATION 7-35-96W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Press.
8-8-74	1755	1304	20.0°	880	*31 gal/min	3"	.52	162.0	350
8-9-7	1005	1334	19.0°	1225		3"	.61	207	375
8-9-74	1600	1364	20.	1210		3"	.69	256	375
8-10-74	0930	1394	21.	1300	|	3"	.60	202	375
8-10-74	2145	1424	21.	1100	22	3"	.64	223	375
8-11-74	1330	1454	23.5	1200	22	3"	.52	162	400
8-12-74	0600	1454	—	1290	20	3"	.73	273	410
8-12-74	2140	1509	23.	1260	20	3"	.65	228	410
8-13-74	0800	1539	21.5	1250	22	3"	.46	134	400
8-13-74	1300	1555	23.	1200	22	3"	.68	245	400
8-14-74	0200	1575	20	1250	22	3"	.34	94	400
—	—	1601	21.5	1240	22	3"	.60	202	400
8-15-74	2025	1631	23	1200	22	3"	.62	213	450
8-15-7	1135	1642	23.5	1200	24	3"	.58	192	400
8-16-74	0025	1672	21.5	1250	24	3"	.48	143	400
8-16-74	0700	1702	22.	1190	24	3"	.62	213	400
8-16	2203	1732	21.5	1225	20	3"	.61	207	400
8-17	6:45	1762	22.5	1200	20	3"	.58	192	400
8-17	14:10	1768	23.5	1300	16	3"	.66	234	500
8-17	19:30	1790	23.	1300	18	3"	.68	245	500

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch #11 LOCATION 7-3S-96W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Press.
8-18	0120	1818	24 °C	1100	15 gal./min	3	.66	234	450
8-18	1125	1848	24.5	1900	15	3	.52	162	500
8-18	1200	1850	24	1600	15	3	.72	268	500
8-18	1300	1855	25	1600	14	3	.75	285	500
8-18	2215	1885	24.5	1625	14	3	.71	262	500
8-19	0610	1915	24.5	1625	15	3	.71	262	500
8-19	1435	1945	24.5	1625	15	3	.71	262	500
8-19	20:08	1963	24.5	1625	15	3	.71	262	500
8-20	0630	1993	24.5	1625	–	3	.53	167	500
8-20	1135	2010	25.5	1700	24	3	.66	234	550
8-20	1300	2027	25.5	1706	24	3	.72	268	550
8-20	2300	2057	24.5	1700	14	3	.74	280	500
8-21	0900	2087	23	1600	18	3	.76	291	550
8-21	1500	2117	25.	1675	18	3	.62	213	525
8-21	1942	2135	25	1600	18	3	.75	285	525
8-22	0145	2155	24	1590	21 gal./min	3	.81	321	525
8-22	1050	2185	25	2650	16	3	.70	256	525
8-22	1730	2212	25.	3000	15	3	.78	303	550
8-23	—	2242	25	3000	16	3	.80	315	550
8-23	1510	2270	24.5	2550	16	3	.82	329	550

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER Sorghum Gulch #11 LOCATION 7-35-96W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - gl/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	REMARKS
8-23	2135	2300	24.5	3025	16 gal/min	3"	.68	245	600
8-24	0700	2330	24.5	3050	16	3"	.80	315	600
8-24	20400	2360	24.5	4100	15	3	.61	207	600
8-25	0500	2390	24.5	4100	15	3	.68	245	600
8-25	1700	2420	25.5	3300	19	3	.68	245	550
8-26	0800	2450	24.	3000	18	3	.82	328	500
8-26	[illegible]	2480	23.5	3000	15	3	.84	340	500
8-27	1145	2510	26.	2700	8	3	.64	223	550
8-27	1815	2540	26.	3000	11	3	.79	309	550
8-28	1207	2570	25.	3800	15	3	.72	268	550
8-28	1818	2600	25.	3000	18	3	.80	315	550
8-29	0705	2630	25.	2800	20	3	.87	350	550
8-29	1805	2660	26.	3000	20	3	.80	315	550
8-30	0100	2690	24.5	2400	14	3	.79	309	550
8-30	1400	2720	25.	2700	22	3	.78	303	500
8-31	0045	2750	24.5	2700	12	3	.74	280	650
8-31	0315	2780	24.5	2500	20	3	.82	328	500
9-1	0220	2810	24.5	3000	12	3	.75	285	600

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SG# 18 LOCATION Cb TRACT NE-SE-25-3S-97W

1974 DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure PSI REMARKS
10-1	0510	475	13° C	750	1.5	3"	No Flow	± 5	200
10-1	0545	505	13.0	650	1.5	3	"	± 5	200
10-1	0625	535	14.0	500	1.5	3	"	± 5	200
10-1	0705	565	13.5	950	3.0	3	"	± 5	200
10-1	0715	580	13.5	900	3.0	3	"	± 5	200
10-1	0740	600	13.5	850	3.0	3	"	± 5	200
10-1	0830	630	14.0	650	3.0	3	"	± 5	200
10-1	0910	660	15.0	575	3.0	3	"	± 5	200
10-1	0942	690	15.0	550	3.0	3	"	± 5	200
10-1	1030	720	15.0	510	3.0	3	"	± 5	200
10-1	1135	750	15.0	570	3.0	3	"	± 10	200
10-1	1230	780	16.0	570	3.0	3	"	± 10	200
10-1	1330	810	16.0	1200	3.0	3	"	± 10	200
10-1	1425	840	16.0	700	3.0	3	"	± 10	250
10-1	1600	870	13.0	500	2.5	3	"	± 10	200
10-1	2030	900	14.0	600	2.5	3	"	± 15	200
10-1	2100	930	14.0	500	2.5	3	"	± 25	200
10-1	2200	960	16.0	600	4.0	3	.16	26	200
10-2	0810	990	15.0	920	7.0	3	.19	34	200
10-2	0935	1020	16.5	900	7.0	3	.28	66	200

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SG-18 LOCATION NE-SE-25-35-97W

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure (PSI) REMARKS
10-2	1045	1050	18°C	890	7	3"	.24	49	200#
10-2	1245	1050	18°C	830	7	3	.26	56	200#
10-2	1900	1110	19	750	7	3	.35	88	200
10-2	0630	1140	18.5	500	6.5	3	.39	104	250
10-3	1300	1170	20	750	6.0	3	.39	104	250
10-3	1730	1200	17.5	600	2.0	3	.50	152	300
10-3	2120	1230	20	700	6	3	.50	146	325
10-4	0400	1260	20	700	6	3	.61	201	300
10-4	0650	1290	20	700	6	3	.64	217	300
10-4	0900	1320	20	750	6	3	.65	228	450
10-4	1212	1350	20.5	850	6	3	.64	217	450
10-4	1650	1380	21	900	0	3	.53	167	260
10-5	0800	1410	20	800	6	3	.60	202	450
10-5	1430	1426	20	800	6	3	.60	202	450

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH #18-A LOCATION Cb TRACT

1974 DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	AIR PRESS. psi REMARKS
10.13		0	°C			3"	NOT UP	0	
10.15	1425	750	16	<500	27	"	" "	0	200
10.15	1550	780	16	<500	27	"	" "	0	200
10.15	1905	810	12	1000	24	"	" "	0	225
10.15	2000	840	13	1100	19	"	" "	0	250
10.15	2145	870	13	800	19	"	" "	0	250

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH #15·A LOCATION Cb TRACT

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	AIR PRESS. psi REMARKS
10·15	2300	900	13°C	1100	12	3"	NOT UP	± 3	175
10·15	0010	930	15	800	12	"	" "	± 13	175
10·16	0430	960	13	900	10	"	.18	21	175
10·16	0800	990	14	500	26	"	.08	0	250
10·16	1005	1020	15	900	36	"	.16	0	275
10·16	1225	1050	17	800	36	"	.16	0	325
10·16	1520	1080	18	700	36	"	.23	10	300
10·16	1620	1110	18	800	36	"	.25	17	300
10·16	2340	1140	18	700	19	"	.32	57	250
10·17	0200	1170	18	700	19	"	.32	57	250
10·17	0525	1200	20	700	19	"	.36	73	250
10·17	0915	1230	20°C	700	29	"	.48	114	350
10·17	1315	1260	20°C	700	24	"	.49	124	375
10·17	1820	1290	21°C	750	34	"	.50	118	375
10·17	2330	1320	22°C	700	31	"	.56	150	350
10·18	0003	1330	20°C	700	31	"	.56	150	375

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH #19 LOCATION Cb Tract

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure psi REMARKS
9-21	1040	255	13.0 °C	850	5	3"	.17	24	100
9·21	1120	282	13.0	850	5	3	.23	41	100
9·21	1213	307	13.5	750	5	3	.25	43	150
9·21	1312	336	14.0	800	5	3	.29	61	150
9·21	1405	365	14.0	750	5	3	.34	79	150
9·21	1505	395	14.5	800	5	3	.49	142	150
9·21	1608	425	14.5	800	5	3	.51	152	150
9·21	1725	455	14.5	750	5	3	.50	147	150
9·22	0110	485	14.0	1025	5	3	.93	400	150
9·22	0425	515	14.5	1125	5	3	.93	400	150
9·22	0645	535	14.0	1200	5	flume washed out.		400	200
9·22	0710	565	14.0	1200	5	estimated volumes.		400	250
9·22	0845	590	14.0	1200	5			400	250
9·22	1150	620	15.5	1200	5	6"	.62	430	220
9·22	1350	650	16.5	1300	3	6	.62	436	250
9·22	1445	680	15.0	1250	2.5	6	.62	436	300
9·22	1930	710	15.0	1200	2.5	6	.62	436	250
9·22	2230	740	15.5	1150	2.5	6	.62	436	250
9·23	0315	770	15.0	1100	2.5	6	.54	349	300
9·23	0930	800	15.0	1300	2.5	6	.49	310	250

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SORGHUM GULCH #19 LOCATION C6 Tract

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - glm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	Air Pressure psi REMARKS
9.23	1135	830	17.0°C	1700	2.5	6"	.65	444.3	300
9.23	1515	845	19.5	2000	2.5	6	.67	493	300
9.23	1650	860	18.0	1950	10	6	.68	494	275 WTR SAMPLE
9.23	1725	870	19.0	2100	20	6	.72	532	400
9.23	1915	900	19.0	2200	30	6	.71	510	375
9.23	2116	930	20.0	2500	40	6	.70	486	410 WTR SAMPLE
9.25	1500	935	21.5	2800	50	6	.80	602	500
9.25	1652	940	21.0	2750	50	6	.75	539	520
9.25	2105	950	21.0	2500	60	6	.78	565	450
9.26	2300	960	20.5	2600	60	6	.70	466	450
9.27	0410	970	20.5	2600	60	6	.71	480	450
9.27	0630	980	20.5	2600	60	6	.70	466	450 WTR SAMPLE

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER S.G-Cb-2B LOCATION ____

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - gpm)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm)	air Pressure [illegible]
8/25	1053	410	16.5° C		6 gpm	6"		15 gpm ±	100 lbs
8/25	1132	440	16.5° C		6 gpm			15 gpm ±	100 lbs
8/25	1220	470	17.0° C		8 gpm			16 gpm ±	100 lbs
8/25	1308	500	17.0° C		8 gpm			15 gpm ±	100 lbs
8/25	1337	530	17.0° C		8 gpm			15 gpm ±	110 lbs
8/25	1420	560	16.5° C		6 gpm			20 gpm ±	110 lbs
8/25	1510	590	16.5° C		8 gpm			20 gpm ±	110 lbs
8/25	1842	620	15.5° C		8 gpm			20 gpm ±	120 lbs
8/25	1937	650	15.5° C		8 gpm			20 gpm ±	120 lbs
8/25	2037	680	16.0° C	1400	8 gpm			20 gpm ±	120 lbs
8/25	2120	710	15.5° C	1200	8 gpm			20 gpm ±	120 lbs
8/25	2220	740	14.5° C	1400	8 gpm			25 gpm ±	120 lbs
8/25	2400	770	12.5° C	1350	8 gpm			25 gpm ±	120 lbs
8/26	0135	800	12.5° C	1350	8 gpm			25 gpm ±	120 lbs
8/26	0300	830	13.5° C	1300	8 gpm			30 gpm ±	170 lbs
8/26	0420	860	13.5° C	1400	8 gpm			30 gpm ±	170 lbs
8/26	0705	890	12.5° C	1300	8 gpm			30 gpm ±	160 lbs
8/26	1708	920	15.5° C	1350	8 gpm			30 gpm ±	160 lbs
8/26	1600	950	16.0° C	1425	8 gpm			35 gpm ±	190 lbs
8/26	1922	980	16.0° C	1400	8 gpm	6"		35 gpm ±	190 lbs

WATER PRODUCTION AND CONDUCTIVITY DATA SHEET

OPERATOR ARCO WELL NAME & NUMBER SG-Cb-2B LOCATION ____________

DATE	TIME	DEPTH	WATER TEMPERATURE	CONDUCTIVITY MICROMHOS	INJECTED WATER (rate - g/m)	FLUME SIZE	FLUME READING	PRODUCTION RATE (gpm) gpm+inj	gpm	air Pressure
8/26	2045	1010	15.5°C	1500	8 gpm	6"	.08	18.5	10	190 lbs
8/26	2328	1040	15.0°C	1450	8 gpm	6"	.12	31	23	190 lbs
8/27	0215	1070	21.5°C	1950	8 gpm	6"	.54	350	342	330 lbs
8/27	0605	1100	21.5°C	1950	8 gpm	6"	.50	310	302	330 lbs
8/27	0937	1130	22.5°C	2100	8 gpm	6"	.54	350	342	330 lbs
8/27	1925	1160	23.5°C	2200	8 gpm	6"	not up			350 lbs
8/28	1917	1190	23.5°C	2200	8 gpm	6"	46	274	266	500 lbs
8/29	0225	1220	23.0°C	2150	8 gpm	6"	.54	350	342	500 lbs